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ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

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SURGICAL LITERATURE ABSTRACTS ARE
PUBLISHED.

	PAGE
BRADFORD, EDWARD H., Boston	259
CARLE, PROFESSOR, Turin	792
COUDRAY, P., Paris	251
DE BONCOURT, A. VON CHAMESSO, Freiburg	244
DUNN, B. S., Los Angeles, Cal.	125
FONTINO, A., Turin	792
GRAF, DR., Berlin	246
JONNESCO, THOMAS, Bucharest	248
MARTIN, CL., Lyon	690
PERTHES, GEORGE, Leipzig	124
PETERSEN, WALTHER, Heidelberg	242
VON EISELBERG, A. FREIHERR, Königsberg	250

ANNALS OF SURGERY.

SOME CONSIDERATIONS ON ABDOMINAL INCISIONS.¹

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THIS subject merits attention from a practical as well as from a theoretical stand-point, both on account of the number of ventral herniæ, which we all meet with, and on account of the variety of incisions proposed and recommended for the same operation, or for various operations in the same area.

It has seemed to me that a discussion of this general subject would be both interesting and instructive, and for this reason I have ventured to introduce it before the Surgical Society.

With the exception of Hahn's operation, in the eighth intercostal space, these incisions are made in an hexagonal area, bounded by the costal cartilages of the six lower ribs above, the transverse processes of the lumbar vertebræ behind, and by the iliac and pubic crests and Poupart's ligament below. Or it may be considered as consisting of two symmetrical quadrilateral areas separated from or adjoining one another at the linea alba in the median line, and having the

¹ Read before the New York Surgical Society, October 13, 1897.

same boundaries above, below, and behind as the above-named figure.

This area, through which practically all abdominal incisions are made, is composed of a number of layers,—*i.e.*, from without inward skin, superficial fascia (two layers), the thin fascia covering the external oblique muscle, the abdominal muscles and their aponeuroses, the transversalis fascia (or the lumbar fascia posteriorly), the subperitoneal connective tissue and fat, and the peritoneum.

The different layers have various degrees and kinds of importance in abdominal incisions.

The skin concerns us most in the difficulty of making it aseptic, especially in such places as the folds of the umbilicus, and where hair-follicles are numerous. Too little attention is paid, it seems to me, to the cleavage lines of the skin as one factor in regulating the direction of incisions. As pointed out by Kocher, if the incision crosses these cleavage lines, and any part of the incision is left open for drainage or other purposes, this opening does not heal as well as when the incision is parallel with the cleavage lines. These lines are, in general, nearly parallel with the lower intercostal nerves, as the latter traverse the abdominal walls.

Of the two layers of the superficial fascia, which are most distinct below, the outer or superficial layer contains the subcutaneous fat, which, if excessive in amount, necessitates very long skin incisions, and may even contraindicate an operation in given cases, so that one prominent surgeon has remarked that no very stout person has any business to have appendicitis. The muscular layers of the abdominal wall are the most important, from a surgical stand-point, in reference to the choice of incisions, for the strength of the abdominal wall is chiefly due to them. They consist of vertically directed muscles front and back,—*i.e.*, the rectus and pyramidalis in front and the quadratus lumborum behind, and, between these vertically directed muscles, of three more or less transverse muscular layers, the direction of whose fibres cross one another obliquely. These muscles, the two oblique and the

transversalis, are in many respects the most important of the abdominal muscles. Their flat, fleshy bellies are found largely at the sides, where they fill in the interval between the vertical muscles, except for a narrow strip at the outer border of the rectus, where their aponeuroses form the semilunar line, and a small semilunar area beneath the conjoined tendon. The fleshy parts of these three muscles cover a somewhat different area. Thus, that of the external oblique is limited below by a horizontal line drawn from a point on the crest of the ilium one to two inches behind the anterior superior spine, and internally by a vertical line from the lowest point of the ninth rib. The fleshy part of the internal oblique is limited above by a horizontal line below the tip of the last rib, and mesially by a line directed upward and a little outward from the centre of Poupart's ligament.

The margin of the fleshy portion of the transversalis is concave mesially, so that above and below it approaches nearer the median line than in the middle. The fleshy portion of the external oblique lies somewhat above the line, between the anterior superior spine of the ilium and the umbilicus, so that in the oblique incisions for appendicitis only the very upper part involves the muscular portion of the external oblique, and sometimes the latter is not even exposed. The direction of the fibres of the aponeurosis of the external oblique continues that of the fleshy bundles, being approximately at right angles to the line joining the anterior superior spine with the umbilicus. The crossing of the fibres of the oblique and transversalis muscles serves several important ends. First and foremost, it strengthens the abdominal wall and greatly diminishes the possibility of hernia between the separated fibres of the muscles. (2) It permits contraction of the abdominal wall in every direction, and thus may prevent the inclusion of the retracted part in the suture, unless the latter be carefully applied. (3) It increases the amount of abdominal pressure for the expulsion of urine, fæces, or the foetus. (4) It permits greater approximation of the movable bony boundaries.

The rectus abdominis muscle is remarkable for its sheath and its fibrous intersections. Its well-marked sheath formed by the aponeuroses of the three flat lateral abdominal muscles joins with that of its fellow mesially to form the fibrous linea alba. This sheath is incomplete behind in its lower fourth, where the underlying transversalis fascia, at this level firm and strong, takes its place. The transverse intersections of the rectus hold its muscular fibres together, and greatly decrease the possibility of their separation, and the consequent formation of a hernia. They resemble transverse scars, and indicate that transverse incision of this muscle, if healed by a proper cicatrix, only increases the number of structures that nature has provided, and therefore, we can infer, may be done without harm.

Under normal conditions the linea alba below the umbilicus is merely the narrow fibrous interval separating the recti muscles, where their sheaths coalesce, and some difficulty may be had to find it.

The transversalis fascia is thick and strong below, and here it is important in strengthening the abdominal wall where the tendency to hernia is greatest, and especially in the space beneath the conjoined tendon and, as above stated, behind the lower fourth of the rectus muscle, where it serves as its sheath. It is separated from the peritoneum by the subperitoneal connective tissue, a loose layer in most places containing fat, which is useful in indicating when we have nearly reached the peritoneum, and in allowing the stripping up of the latter from the overlying layers, or *vice versa*.

A most important and too often neglected element of the abdominal walls are its nerves, comprising the six lower dorsal, the ilio-hypogastric, and the ilio-inguinal nerves. Their motor portions pass, for the most part, between the internal oblique and transversalis muscles, which, together with the external oblique, they supply, and then they pierce the sheath of the rectus muscle to furnish its motor nerve-supply.

The direction of these nerves is of great importance, as

pointed out by Kocher, in determining the direction of abdominal incisions, for their division causes paresis and atrophy of the muscles, weakens the abdominal wall, and predisposes to hernia. In the anterior abdominal wall these nerves pass downward and inward, in the lower third (*i.e.*, eleventh and twelfth intercostal and ilio-hypogastric and ilio-inguinal nerves) nearly transversely inward in the middle (*i.e.*, ninth and tenth intercostal nerves), and upward and inward above (*i.e.*, seventh and eighth intercostal nerves). The lower nerves are more transverse than the fibres of the external oblique and its aponeurosis, so that one or more nerves may be exposed or injured in an oblique incision for appendicitis, but with care they may be spared. Vertical incisions of any length cannot avoid the exposure of one or more nerves, except in or near the median line.

The blood-vessels of the abdominal wall may be left out of account in planning incisions, though, if not otherwise indicated, it is as well to avoid the deep epigastric artery which passes upward and inward from near the middle of Poupart's ligament towards the umbilicus until it has entered the sheath of the rectus muscle posteriorly, where it ascends more vertically. In case of its division, we may remember that it anastomoses with the superior epigastric branch of the internal mammary artery.

Turning to the practical side of the subject, we find that old or even existing methods of incision do not give universal satisfaction, as evidenced by the many new procedures suggested. In every incision the requisites, as emphasized by Kocher, are free access and the avoidance of large vessels and of nerves. In addition to these, in abdominal operations, we have to consider the possibilities of a hernia. This is more likely to occur after incisions in the lower half of the abdomen, where the majority of operations are performed. We should also remember, as Hyrtl says, that aponeurosis is less resistant than muscle, and choose our incisions accordingly. Formerly most operations were done in the linea alba or linea semilunaris, now the incision in the latter has

given way largely to oblique incisions, especially when done for appendicitis. That the danger of hernia is a real one after the last-named operation is shown by the statement of Coley (ANNALS OF SURGERY, August, 1897, p. 226) before this society, that fifty-five cases of hernia following operations for appendicitis had been observed during two years at the Hospital for the Ruptured and Crippled.

Of the various incisions for appendicitis, the vertical one, in the semilunar line, is objectionable (1) because it divides some of the nerves (tenth, eleventh, and twelfth dorsal nerves, and if longer, the ilio-hypogastric nerve) supplying the rectus muscle, thereby weakening it and the abdominal walls; (2) because it is entirely fibrous tissue or nearly so, the layers of which cohere together in healing, and furnish a thinner and weaker cicatrix than one through muscular tissue. In certain suppurative cases, where the tumor lies unusually far inward, it may furnish the best and safest access, and then the saving of life far outweighs future consequences of the incision. To such cases we may well limit the use of this incision. We are all of us familiar with the thin cicatrices and bulging of the lower abdominal wall that follows this incision, and relatively it is far more apt to be followed by hernia than other incisions for appendicitis.

An ingenious modification of the vertical incision is that advocated by Jalaguier (*Presse Médicale*, February 10, 1897) and a little later by Kammerer (ANNALS OF SURGERY, August, 1897). It consists in the vertical division of the superficial layer of the sheath of the rectus, about one to two and a half centimetres from its outer border, the retraction of the intact muscle inward and the division of the posterior layer of the sheath and the subjacent layers in about the same line as that of the incision of the superficial layer of the sheath. I have found that this, like the vertical incision in the semilunar line, exposes very well the appendix in its most usual position (*i.e.*, pointing in some direction inward). Its chief objection is the injury of the nerves (tenth, eleventh, and twelfth dorsal, with or without the ilio-hypogastric). As

Kammerer says, "It would be better to avoid this," owing to the resulting atrophy of the rectus, but, judging from dissections I have made of the part, this would be a difficult matter. Although atrophy and paresis of the part of the rectus muscle may result from the nerve section, the method of suture and the trap-door character of the wound would make subsequent hernia almost impossible. In this respect it is far preferable to the vertical incision in the semilunar line, and McBurney's objection to opening the rectus sheath in the latter incision has no force as applied to the Jalaguier-Kammerer method, for it does not interfere with the neat apposition of the edges of the wound, and it is not necessarily attended by much bleeding, for though Kammerer divided the deep epigastric in four out of five cases, this is of no importance, and it can in most cases be easily avoided by incising the posterior layer of the sheath, as Jalaguier does, farther outward than Kammerer advises.

This incision, it should be borne in mind, is only applicable and only recommended for appendicitis in the quiescent state, for if pus is present and drainage is necessary the incision is too tortuous, and the sheath of the rectus being opened is exposed to the dangers of the extension of pus.

The oblique incision, or its modification by McBurney, has of late years largely supplanted the vertical ones for most cases of appendicitis, and for two reasons: (1) the avoidance of the nerves, and (2) the strengthening of the scar by going through or between the fibres of muscular tissue instead of through fibrous tissue. The chances of hernia are thereby diminished. Furthermore, in acute suppurative cases, as McBurney has pointed out, in the majority of cases the appendix may be most easily found and exposed, septic fluids most safely removed, and drainage best maintained when the appendix is approached from the outer side. When continuous free drainage is required there is less liability to subsequent hernia, when the opening lies well to the side instead of nearer the median line of the abdomen. It is not necessary to describe these methods minutely. The line of both

of them is rather external to the usual position of the appendix, though not so far that it is not readily exposed, and, as above stated, it is rather an advantage to approach it from the outside. In both methods of the oblique incision the line of the fibres of the external oblique aponeurosis is usually followed, which is approximately at right angles to the line between the anterior superior iliac spine and the umbilicus. The distance of the incision from the spine averages from one and a half to two inches. In the ordinary oblique incision, after separating the fibres of the external oblique aponeurosis, the incision divides the thick fleshy portions of the internal oblique and transversalis muscles. If the incision follows the direction of the fibres of the external oblique aponeurosis throughout its entire depth, the twelfth intercostal and—in long incisions—the ilio-hypogastric nerves are in danger of being divided, as I have found from experience and dissections. With some care and trouble they may be avoided and held out of the way, but the best way, I have found, of accomplishing this and the way I would recommend is to make the division of the muscle fibres, among which the nerves in question lie, slightly more transverse than the line of the aponeurotic fibres of the external oblique, and thereby more nearly parallel with the nerves. With these precautions this incision is an excellent one, the exposure good, drainage well provided for, the resulting scar thick and firm, and subsequent hernia unlikely unless the wound itself should suppurate. In the McBurney method the nerves are avoided by the fact that the separation of the muscular fibres of the internal oblique and transversalis muscles is nearly transverse and not far from parallel with the direction of the nerves in question. This muscular separation is not quite at right angles to that of the overlying aponeurotic fibres.

Like the modification of the vertical incision, the McBurney method is especially applicable to appendicitis in the quiescent state, and its author limited his recommendation of it to such. Its use has, however, been extended to suppurative cases by Stimson, with or without a deep vertical incision external to the rectus muscle.

In my own experience, the oblique incisions have given the best satisfaction for the past three years or more, and the intermuscular method of McBurney is the most ideal one in suitable cases, for, as Richardson says, the dangers of hernia are enormously decreased. The same method is applicable to other conditions,—*i.e.*, temporary compression of the common iliac artery in exarticulation at the hip-joint, as recommended by McBurney, or for left inguinal colotomy, as recommended by Pilcher, though in the latter class of cases Verneuil advises against merely separating the muscle-fibres, because it interferes with the escape of fecal matter.

The comparative freedom from herniæ of incisions made through fleshy parts of the abdominal wall is illustrated by operations on the kidney. To be sure, such incisions are much less predisposed to herniæ than those we have so far considered, for they are situated more laterally as well as higher up. The transverse incision below the last rib prolonged, if need be, to the rectus (or even through it) gives free access to the parts, and suffices for most purposes. It is in line with the cleavage lines of the skin, a useful point in case of drainage, and with the last dorsal nerve, which it is therefore easy to spare. If more room is required, I have found König's incision very serviceable, though, owing to the obliquely vertical posterior limb of this incision, there is more danger of injury to nerves, so it is well to flatten or round off the angle. These lumbo-abdominal incisions, if carefully sutured, rarely give rise to hernia.

In incisions in the upper part of the abdomen, though scars here are not so prone to hernia as those lower down, and though we should not handicap our work by too small an exhibition of parts at best not easy of approach, we should strive for the most room with the least incision. I have found the vertical incision at the outer border of the rectus muscle, plus a transverse division of the latter, gives a free access to the biliary passages. But this is objectionable, as it divides nerves (eighth, ninth, and tenth dorsal) supplying the rectus muscle, causes partial paralysis, and favors abdom-

inal herniæ. The vertical median incision with a transverse cut at the level of the umbilicus, as advocated by Czerny, would do away with this objection, and the danger of cutting an occasionally open vein in the round ligament is of little moment. The obliquely transverse incision below the costal margins gives a roomy approach to the same region (the deep subhepatic space). It also is in line with the cleavage lines of the skin and the intercostal nerves (seventh and eighth), and therefore causes no paralysis or tendency to hernia. It may be prolonged to or through the rectus muscle, thereby only adding an artificial tendinous intersection. If absolutely necessary to get sufficient space a vertical incision may be added, as Heineke says, in the semilunar line, but this I imagine will be seldom really required, and should otherwise be avoided.

I only mention the operation of gastrostomy to refer to the use of the rectus muscle as a sphincter in von Hacker's operation.

The majority of abdominal operations have been and still are done in the median line, in the fibrous tissue of the linea alba. One naturally chooses the middle line in most exploratory operations, where the indications point to no definite spot, in most gunshot wounds, in operations on the pelvic viscera, and in many other conditions.

I have often wondered, however, why the incision should be kept so strictly to the median line. I could see a possible reason for not opening the rectus's sheath in suppurative cases, but these form a small minority of all cases. About two years ago this question was raised in an article in the *Lancet* (November 30, 1895) by F. W. Ramsay, an English surgeon. The reasons assigned for incision in the linea alba are: (1) its slight vascularity, (2) its few and unimportant structures to be cut through, (3) the ready access to all parts. As Ramsay points out, the slight vascularity is really a disadvantage, for it tends to delay rapid and firm healing, and therefore predisposes to hernia, while hæmorrhage elsewhere in the abdominal walls may be speedily and easily controlled.

The second reason is also a disadvantage, for it not only renders it more difficult to know the exact depth of the incision, but also in healing the compact fibrous layers cohere together and form a comparatively thin scar, which leads to a hernia more often than any other form of abdominal incision. The third reason applies equally well to any other incision close to the median line. The median incision is also objectionable in case it is necessary to extend it close to or past the umbilicus, as that cannot be rendered certainly aseptic.

As a substitute for the median incision Mr. Ramsay suggests a vertical incision through the middle of either rectus muscle, and gives as some of its advantages (1) the vascularity of the parts which tends to rapid and efficient healing, though there is no troublesome hæmorrhage, for even if the deep epigastric artery is cut it is easily secured; (2) the muscle is not injured by the separation of its fibres; (3) the umbilicus is not in the way and the incision can be prolonged from the ribs to the pubes; (4) access to all parts is just as easy as in the median line; (5) the layers are so well marked that it is easy to tell the nearness to the peritoneum, and, in the scar, layer is united to layer, the cicatrix is deep, firm, and does not pucker, but looks like a skin incision only; (6) most important of all, the wound, if properly closed, greatly reduces the danger of a hernia. That these are real advantages I think all will admit. There may occur to us certain objections which may slightly modify the technique and even limit its application in certain cases.

If the incision is to be extended upward, past the umbilicus, we meet with the transverse intersections. That these, however, present no obstacle I have proved to my own satisfaction by experience and dissection. Very little dissection is required to continue the otherwise blunt separation through them, and it is to be remembered that they do not extend to the posterior layer of the sheath. One point which I have observed is to be borne in mind,—namely, that in or near the transverse intersection at the level of the umbilicus

and the one next above there is found the tenth and eighth intercostal nerves respectively. In order to avoid wounding these and the other nerves which supply the rectus I would propose making the incision nearer the inner border of the rectus, say one to one and a half centimetres from this border. This would spare nearly all the nerve-fibres, as well as the deep epigastric artery, and, being even nearer the median line, would give still better access to all parts. Or perhaps even better yet, especially in cases not requiring drainage, would be a modification according to the Jalaguier-Kammerer method, as practised along the outer border of the same muscle. The entire nerve-supply would then be spared, the access would be equally free, and the dangers of hernia effectually provided against. In closing the wound the inner border of the rectus muscle could be fastened by a suture or more to the inner margin of its sheath, as Jelaguier does with the outer border of the muscle. Although I have found by experience that the previous modification suggested is very satisfactory I have only employed the latter on the cadaver, but from such experience I am sure that it will be equally if not more satisfactory. The objection may suggest itself to all operations opening the sheath of the rectus in case of any suppurative condition. Such cases are the small minority in median abdominal operations; modern technique in such an emergency is capable of preventing the spread of infection, and in case of necessity we may suture together the two layers of the sheath on both sides, and thus shut off the cavity of the sheath from the wound. In known suppurative disease some might prefer the median incision. That surgeons are awakening to the fact that abdominal incisions in the fibrous lines give weaker cicatrices and are more prone to subsequent herniæ than those through or between muscular fibres is seen in modern periodic literature. Thus Mr. A. E. Barker, of London, considers the inclusion of muscular fibres in the suture of abdominal wounds so important that he says (*Clinical Journal*, London, 1896-97, pp. 193-7), "Where I have the choice, the position of my incision is de-

terminated by the presence of muscle rather than of an aponeurotic line, because in the former case the scar is far firmer." Along the same lines (*i.e.*, the strengthening of the cicatrix by making it in thick muscular tissue) Halsted advises in his operation for the radical cure of inguinal hernia to incise well outward and upward into firm, thick, muscular tissue in case that part belonging to the conjoined tendon about the level of the internal ring is thin and atrophied. Habit is strong, however, and many, if not most, may cling to existing methods in spite of faults which they do not deem of vital importance instead of striving for perfection.

I would emphasize the following conclusions among those which may be drawn from the above considerations:

(1) That abdominal incisions, except those in or close to the median line, should be obliquely transverse in order to parallel the nerves (and thereby also the cleavage lines of the skin) so as to avoid partial paralysis of the muscles, weakness of the abdominal wall, and a tendency to hernia.

(2) That intermuscular or even transmuscular incisions should be preferred to those in the linea alba or semilunaris, for in both the latter cases the cicatrix is less strong and more prone to hernia, and in the semilunar line the nerves are necessarily divided.

(3) That in place of the median vertical incision, the intermuscular incision near the inner margin of the rectus, or the trap-door incision around this inner margin offers many important advantages.

THE REMOTE RESULTS AFTER OPERATIONS FOR RENAL TUBERCULOSIS.

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CONSULTING SURGEON TO ST. LUKE'S, THE METHODIST EPISCOPAL, AND THE
CITY HOSPITALS, ETC., ETC.

It is not the purpose of this paper to enter into a discussion of the advisability of operation for renal tuberculosis. This has been done recently and ably by Drs. Willy Meyer and F. Tilden Brown, whose material I have made use of in the summary which I shall present hereafter. It happens, furthermore, that all my personal operations on the kidney have been either for exploration, drainage, calculi, or neoplasms. Therefore I have no personal experience to narrate in either nephrotomy or nephrectomy for tuberculosis of the kidney. Of the several cases of this disease, which have been under my care for longer or shorter periods, some of them have been unoperable, others have refused operation. As the latter improved under hygiene, I was led to consider whether my prejudices in favor of operation were well founded, and whether the remote results after operation have been any better than those obtained by hygiene,—that is to say, whether sufficient cell-energy cannot be obtained by hygiene to protect against further local infection, and thus be as curative as would nephrectomy itself? To emphasize the query which I have just stated, let me briefly narrate a typical case:

A man, aged twenty-five years, a porter by occupation, came under my observation in April, 1896. About five years before, while lifting a heavy weight, he felt a sudden severe pain in the

right side just above the crest of the ilium, in the posterior axillary line. There were no after-symptoms. Two years later—that is to say, three years ago—he had a sudden pain in the right kidney region associated with vomiting, and was compelled to take to his bed. The next morning the pain had entirely disappeared. Four months later he developed pain in the left testicle, and the latter increased in size. The pain spontaneously disappeared in about five hours, but in the mean time an attack of severe pain in the right kidney associated with vomiting supervened, and lasted several hours. Attacks of pain in the right lumbar region, associated with nausea, vomiting, and frequent urination, nearly always preceded by or accompanied with pain in the left testicle, have recurred more or less frequently ever since. He has had also a tickling at the head of the penis, and occasionally blood in his urine. About two years ago attention was called to his urine by a physician. Prior to that he had noticed nothing wrong with it himself. Since then, in the intervals, his urine has been thick, milky white, with abundant shreds and detritus in it, but during an attack the urine diminishes in quantity, loses its milky-white color and consistency, and becomes perfectly clear and urinous. The patient can always tell by a sensation as if something were “slipping down” in his right side, just when the pain is about to cease. Then the milky-white color of his urine suddenly reappears and the detritus again appears. At his first appearance he has the pale, haggard look of a man suffering from some cachexia. He has no rise of temperature, no chills or sweats, but he has lost weight, and now weighs, he says, 178 pounds. He is of large frame and is emaciated. Palpation of the right lumbar region develops a distinct sense of “fulness” in that region, but the kidney cannot be outlined. His left epididymis is swollen, lumpy, hard, and tender. In the milky-white urine are abundant tubercle bacilli. He refused all operative procedure positively, but he consented to change his occupation, and was given hygienic directions and internally creosote. He gradually and steadily improved. The attacks of pain lessened in frequency and severity, and for several months now he has had no attack whatever. The presence of bacilli has been variable, and at times but few can be found in the urine. He now weighs 197 pounds, is engaged briskly in an open-air occupation, and to all appearance is a hale, hearty man.

Of course, I do not by any means claim that this man is *cured*, but that the disease is in a state of abeyance and that no new foci have developed is undoubted. I have selected this case from a class in the community which cannot ordinarily change its avocations nor command the conditions of life which good hygiene demands, to serve as a type of the improvement which even in this class may be obtained without resort to operation.

He is still menaced by the presence of tubercle bacilli, but can these be entirely and radically removed excepting by the processes of nature? Does an operation do any more than enable the cell-activity of an individual to carry on this process? Of course, if operation promises better results than leaving the patient to the uncertain action of hygiene, it is the procedure which must be resorted to; but the value of an operation is to be determined not only by its immediate results, but also by its effects in prolonging human life, and by a radical cure of the disease for which the operation is performed. To arrive at some definite conclusion as to these effects, I instituted a search of the literature, and also sent blanks to leading surgeons in this country for reports of operations for renal tuberculosis. The results of these reports can be presented in few words,—not at all commensurate with the time and labor expended in obtaining them,—and I fear that, in so far as the facts relate to the object of this paper, they will be considered meagre and unsatisfactory. Possibly they are not new, but they are interesting and worthy of repeated study. The first and undoubted conclusion which they warrant is that the *immediate* results of the operations for renal tuberculosis, in the cases in which they are indicated, are brilliant. Many cases which seem to be *in extremis* and liable to speedy death from hectic, hyperpyrexia, pain, etc., have been immediately relieved, their existences made tolerably comfortable, and their lives prolonged. But a clear and positive conclusion as to the *remote* results has been an exceedingly difficult one to reach. The cases reported vary in detail; many of the facts have been

stated vaguely; and, moreover, so many of the cases have been lost sight of that the conditions of the patient after months or years, and *during* these months and years, are unknown. Still, I think the opinion, based upon such statistics as I have been able to get, is warranted that operation affords better remote results than hygiene. The observations of purely medical men in regard to this would be interesting and instructive, for nowhere in the literature have we been able to find records of cases cured by hygienic or palliative measures alone.

Before submitting the details and summary of the cases which I have accumulated, I present the subjoined abstract of an article by F. C. Facklam ("Die Wegen Nierenphthise vorgenommenen Nephrotomien," etc., *Archiv für klinische Chirurgie*, 1893, Vol. xlv, pp. 715).

Facklam's 108 cases, scientifically collected, with references (Newman's sixty odd almost all included), gave the following conclusions:

(1) Of 103 cases with sex stated, seventy-three were women,—70.8 per cent.

(2) Ages: One to ten years, 7 per cent.; eleven to twenty years, 9.4 per cent.; twenty-one to thirty years, 37.6 per cent.; thirty-one to forty years, 37.6 per cent.; forty-one to fifty years, 7 per cent.; over fifty years, 1.2 per cent.

(3) Of seventy-two cases in which diagnosis was made, tuberculosis was proved or probable in forty-three,—59.7 per cent. In the others the diagnosis was made only after operation. The mistaken diagnoses were principally stone, simple pyonephrosis, or neoplasm.

(4) Nephrotomies, twenty in number; twelve died,—mortality 60 per cent. Secondary nephrectomy still more unfavorable.

(5) Nephrectomies, eighty-eight; one "unimproved," twenty-five died,—mortality 28.4 per cent.; of these, however, four survived two to five months, dying of phthisis; one died two years later from amyloid *degeneration* of the other kidney, due to persistent suppuration; three died of some

other cause (not the operation). Of the remaining seventeen, eight died of uræmia or anuria, due to incompetence of the other kidney; nine died of the operation itself; five of collapse, one of sepsis, one of acute miliary tuberculosis, two undetermined. Of the five dying of collapse, transperitoneal method was followed in four. Among the cases cured: Fourteen cases remained well or greatly improved for a term of years.—three and a half, five and a quarter, etc.; five cases died subsequently of phthisis or an intercurrent febrile disease, but survived six months or more after the operation.

It will be observed that in seventy-two of his cases in which diagnosis was made before the operation, tuberculosis was proved or probable in forty-three,—or 59.7 per cent. In the others, the diagnosis was made only after operation. In the series of cases which I have had collected for me, the diagnosis of tuberculosis before operation was made in seventy-eight,—or 58 per cent. This percentage should have been better, and would have been, if the best means of diagnosis had been used. For, since 1888, the date from which I have had my cases selected, the means of diagnosis have been improved and made more accurate, especially through the perfection of the cystoscope and catheterization of the ureters. This fact, together with the fact that in 1889 Newman's work on the surgical diseases of the kidney was published, led me to select the last ten years as an arbitrary period in which to begin my research. It should also be stated that all of Facklam's cases have been carefully excluded. Therefore I believe that the cases which I herewith present have never before been summarized. There have been obtained from the literature 105, and through the courtesy of surgeons to whom a blank was sent requesting details of their cases, thirty cases more, making in all 135 cases.

DETAILS AND SUMMARY.

Detailed Statement of Results of Operation for Renal Tuberculosis.—Deaths, one month or less: Cases XXI, XXII,

XXIV, XXXIII, XXXIV, XXXV, XLIV, XLV, LII, LIX, LX, LXII, LXV, LXVI, LXXI, LXXIII, LXXIX, LXXXVIII, XCV, XCVI, XCIX, CVIII, CXVII, CXX, CXXVI, CXXVIII, CXXXIV. Total, 27.

Remote Results.—No record: Cases II, IV, V, XV, XVI, XVII, XXVII, XXXI, XL, XLVI, XLVIII, L, LXVII, LXXV, LXXXII, LXXXV, XCI, CXI, CXII. Total, 19.

Died two to three months: Cases XXVI, XXIX (phthisis), XXXII (phthisis, one and one-half months), LXXII (phthisis), CV ("some months," tuberculosis), CIX (extension tuberculosis). Total, 6.

Died four to nine months: Cases XI ("alive" eight months later, but other kidney affected), VII, LIII, XCIV, C (of nephrectomy following nephrotomy), CVII (tubercular meningitis, five months), CXXXV. Total, 7.

Whole number of deaths in nine months, $6 + 7 + 27 = 40$.

Survived at least one to two years: Cases VI, IX, XIII, XXV (ten months), XXX, XXXVI (two years), XLII, XLIII, LIV, LVII, LVIII, LXIV, LXXIV, LXXVI, LXXVII, LXXVIII, LXXXVII, XCII, XCVII, XCVIII, CI, CII, CIII, CVI, CX, CXIV, CXV, CXVI, CXIX, CXXI, CXXIII, CXXV, CXXIX, CXXX. Case XXVIII recovered "permanently." Total, 35.

Detailed Statement.—Survived two and a half years: Case XXXVIII; three years, Cases III, XII, CXXVII; three and a quarter years, Case XXXIX; three and a half years, Case XIV; four years, Case XXXVII; four and a half years, Case CXVIII; five years, Case LXXXIX; eight years, Case LXIII. Total, 10.

Survived one to eight years: $10 + 34 = 44$,—about 34 per cent.; more exactly, 33.85 per cent.

Prognosis good or improvement great in cases alive one to nine months after operation: Cases XLIX and CXXXIII, one month; Case LXX, one and a half months; Case LXXXI, two and a half months; Case LXIX, three months; Case LXXXIII, three and a half months; Case LXXXIV,

two months ("hectic"); Cases XVIII, XIX, LXXX, XC, and CIV, four months; Cases LI, LVI, LXVIII, LXXXVI, and XCIII, five months; Cases CXXIV and CXXX, six months; Cases LXI and CXIII, seven months; Cases XX and CXXXII, nine months. "Some" months, "few" months, etc., Cases LV, XXIII, XLI, VIII, I, CXXII, X, XLVII. Total, 31.

SUMMARY.

Whole Number of Cases, 135.—Deaths, one month or less after operation: Exhaustion, two cases; extension tuberculosis, two cases; uræmia (42 per cent.), eleven cases; various accidents, twelve cases. Deaths, total immediate, twenty-seven.

Operative mortality $\frac{27}{135} = \frac{1}{5} = 20$ per cent.

Remote Results.—Of nineteen cases no record. Of the remaining eighty-nine cases: Died two to three months, six cases; died four to nine months, seven cases. Total, thirteen. Immediate deaths, twenty-seven. Number of deaths within nine months, forty.

General mortality after operation, $\frac{40}{135} = 29.63$ per cent.

Survived one to eight years, forty-five cases, or $33\frac{1}{3}$ per cent.

Prognosis good or improvement great in patients alive one to nine months after operation, thirty-one.

Total, survivors and promising cases, $31 + 45 = 76$, or in per cent., $\frac{76}{135} = 56.3$ per cent.

For the details of the state of health of the thirty-five cases who survived at least one to two years, which are instructive and in the main encouraging, I refer you to the schedule which I submit herewith, and ask attention only to those which may be termed cases of *prolonged survival*. Of these there were ten.

CASES XXXVII, XXXVIII, and XXXIX of my list, reported by Hildebrand from König's Clinic, are said to be alive and well, with urine normal after a period of two and a quarter,

two and a half, and four years respectively after the operation. Presence or absence of bacilli not mentioned.

CASE III (H. A. Kelly).—Bacilli were found, and ureters catheterized. Three years later the patient was reported "stout and in excellent health, and goes about everywhere with but one of her old discomforts,—frequency of micturition."

CASE XII (G. Perthes).—Bacilli found. Bad family history of tuberculosis. Lungs involved. Three years after operation patient was in satisfactory condition and going about her housework. Still had occasional pains in the bladder, after which her urine was generally cloudy. Presence of bacilli at this time not mentioned.

CASE XIV (G. Perthes).—Bacilli found; lungs were normal. Patient—a factory hand—was reported well and at his work two and a half years after. Had had one attack of hæmaturia December, 1893, one and a half years after operation.

CASE LXXXIX (J. Knowsley Thornton) was entirely well five years after. Had complained of pain in the side once in that period, but only temporarily. Bacilli not looked for.

CASE CXVIII (F. H. Markoe) was in excellent health May, 1897, four and a half years after operation. Bacilli not mentioned. Kidney removed. Is recorded to have been tuberculous.

CASE CXXVII (H. Bräuninger) was well three years later, October, 1896, and had been once successfully confined. An abdominal hernia resulted from the operation, but the patient had no pain, and the urine was normal. Cheesy tuberculosis of kidney and ureter was demonstrated under the microscope.

CASE LXIII (A. Martin).—Primary renal tuberculosis. The patient, with proper treatment, such as residence in the South and in special institutions, had recovered, and was now, eight years after operation, to be pronounced entirely free from tuberculosis.

In conclusion, I desire to express my acknowledgment to Dr. William N. Berkeley for his valuable aid in the preparation of this paper. I desire also to express my appreciation of the courtesy of Drs. Carl Beck, F. Tilden Brown, A. J. McCosh, F. H. Markoe, Willy Meyer, and Robert F. Weir, of New York, Drs. L. McL. Tiffany, of Baltimore, John O.

Polak, of Brooklyn, W. T. Belfield, of Chicago, and Charles P. Noble, of Philadelphia, for sending me the records of their unpublished cases.

CASES OF NEPHRECTOMY AND NEPHROTOMY FOR TUBERCULOSIS OF THE
KIDNEY REPORTED IN THE LITERATURE SINCE 1887, OR PRIVATELY
COMMUNICATED.¹

CASE I.—April 11, 1896; L. W. Hotchkiss, *Annals of Surgery*, 1896, Vol. xxiv, p. 496. Female, twenty-six years. Clinical diagnosis, "stone in kidney." Pathological diagnosis, kidney thought to be "in early stage of tuberculosis;" no bacilli found. Lumbar nephrectomy. Previous duration of case, pain for eight weeks. Results, discharged in a few weeks, cured.

CASE II.—July 29, 1895; L. E. Barnett, *New Zealand Medical Journal*, 1896, p. 14. Female, thirty-eight years. Clinical diagnosis, "intermittent hydronephrosis." Pathological diagnosis, tuberculosis of kidney and ureter. Nephrectomy, "usual oblique incision a little below last rib." Previous duration of case, seven years; for eighteen months, severe. Results, patient had phthisis of both apices, but was discharged, August 12, much benefited.

CASE III.—March 30, 1893; H. A. Kelly, *Johns Hopkins Hospital Bulletin*, 1896, Vol. vii, p. 31. Girl, age not stated. Clinical diagnosis, tuberculosis; bacilli found; ureters catheterized. Pathological diagnosis, tuberculosis of kidney and ureter. Nephro-ureterectomy. Previous duration of case, not stated. Results, recovery prompt. Patient in excellent health, February, 1896.

CASE IV.—December 18, 1895; H. A. Kelly, *Johns Hopkins Hospital Bulletin*, 1896, Vol. vii, p. 31. Female, twenty-three years. Clinical diagnosis, probable tuberculosis; normal bacilli not found. Pathological diagnosis, confirmatory. Nephro-ureterectomy; extraperitoneal abdominal incision. Previous duration of case, from childhood. Results, recovery uncomplicated.

CASE V.—October, 1895; H. A. Kelly, *Johns Hopkins Hospital Bulletin*, 1896, Vol. vii, p. 31. Female, thirty years. Clinical diagnosis, suspected tuberculosis; no bacilli found. Pathological diagnosis, entirely confirmatory. Nephro-ureterectomy; anterior incision. Previous duration of case, two years. Results, recovery prompt.

CASE VI.—February 2, 1895; H. L. Miller, *Intercolonial Medical Journal of Australasia*, 1896, Vol. i, p. 111. Female, twenty-six years. Clinical diagnosis, tuberculosis; bacilli found. Pathological diagnosis, entirely confirmatory. Lumbar nephrectomy. Previous duration of case, one year. Results, slow recovery; complete a year afterwards.

CASE VII.—August, 1894; B. Holmes, *Journal of the American*

¹ Plan of classification copied from Newman.

Medical Association, September 5, 1896. Female, thirty-four years. Clinical diagnosis, pyonephrosis and stone. Pathological diagnosis, stone found; also tubercular tissue. Nephrotomy. Previous duration of case, three years. Results, improved; death five months later from involvement of other kidney. Aspiration had been done by another surgeon previously.

CASE VIII.—April, 1896; B. Holmes, Journal of the American Medical Association, September 5, 1896. Female, forty years. Clinical diagnosis, pyonephrosis of one kidney. Pathological diagnosis, doubtful, probably tuberculosis. Lumbar nephro-ureterectomy (implantation). Previous duration of case, ten years. Results, greatly improved at time of writing, few months later.

CASE IX.—Date not given; J. Israel, *Deutsche medicinische Wochenschrift*, 1896, Vol. xxii, p. 345. Female, twenty-three years. Clinical diagnosis, probably tuberculosis. Pathological diagnosis, confirmatory. Lumbar nephrectomy of half the kidney. Previous duration of case, three months. Results, in health a year after operation; five months pregnant at time of report.

CASE X.—February 8, 1896; L. Casper, *Berliner klinische Wochenschrift*, April 27, 1896. Female, forty-two years. Clinical diagnosis, "nephrophthisis dextra, tuberculosis circumscripta vesicæ;" bacilli found; ureters catheterized. Pathological diagnosis, confirmatory. Nephrectomy (by Professor Olshausen). Previous duration of case, six months. Results, prompt and complete recovery.

CASE XI.—June 26, 1894; G. Perthes, *Deutsche Zeitschrift für Chirurgie*, 1895-96, Vol. xlii, p. 201. Female, twenty-two years. Clinical diagnosis, tuberculosis of kidney, left side. Bacilli found; bad history. Pathological diagnosis, confirmatory. Left lumbar incision; plastic operation on bladder also, January, 1894. Previous duration of case, from fourteenth year. Results, still alive after eight months; prognosis bad; right kidney affected.

CASE XII.—August 2, 1892; G. Perthes, *Deutsche Zeitschrift für Chirurgie*, 1895-96, Vol. xlii, p. 201. Female, seventeen years. Clinical diagnosis, tuberculosis; bacilli found; bad history; lungs involved. Pathological diagnosis, disease not advanced; no diagnosis made ("Kein pathologischer Befund"). Lumbar nephrectomy, ureter not removed. Previous duration of case, four years. Results, quite well three years after; pyelitis still causing pain.

CASE XIII.—February 22, 1894; G. Perthes, *Deutsche Zeitschrift für Chirurgie*, 1895-96, Vol. xlii, p. 201. Male, forty-one years. Clinical diagnosis, tuberculosis; numerous bacilli. Pathological diagnosis, miliary and cheesy tubercles. Extirpation; nephrectomy. Previous duration of case, one and a half years. Results, slow recovery. General health good, January, 1896. Small fistula persistent.

CASE XIV.—July 20, 1892; G. Perthes, *Deutsche Zeitschrift für Chirurgie*, 1895-96, Vol. xlii, p. 201. Male, forty-one years. Clinical diagnosis, tuberculosis; bacilli found; lungs in good condition. Pathological diagnosis, tuberculosis. Lumbar nephrectomy. Previous duration

of case, one year and three-quarters. Results, complete recovery; well. October, 1894. One attack of hæmaturia, December, 1893.

CASE XV.—Fall, 1895; M. Rafin (*Société des Sciences médicales de Lyon*), *Annales des Maladies des Organes Génito-Urinaires*, 1896, Vol. xiv. pp. 447-8. Female, twenty years. Clinical diagnosis, not stated; lungs clear; right kidney very large, immovable; old white swelling of knee; bacilli not found. Pathological diagnosis, advanced tubercular and "cavernous" kidney. Lumbar nephrectomy. Previous duration of case, four years. Results, doing well ten days after operation.

CASE XVI.—1895; L. C. Trautenroth (*Cases XV and XVI reported from Mittheilungen aus dem Grenzgebiete, etc., 1895, Vol. i, p. 136*). Female, twenty-two years. Clinical diagnosis, violent hæmaturia "found to proceed from one kidney." Patient entirely well heretofore. Pathological diagnosis, beginning tuberculosis. Lumbar nephrectomy. Previous duration of case, sixteen days. Results, patient left hospital too soon; according to last news scar had reopened and patient was very weak.

CASE XVII.—June 23, 1893; J. Israel, *Archiv für klinische Chirurgie*, 1894, Vol. xlvii, Heft 2. Male, thirty-four years. Clinical diagnosis, pulmonary phthisis, pleurisy, and left renal tuberculosis. Pathological diagnosis, confirmatory. Lumbar nephrectomy. Previous duration of case, over two years. Results, still under treatment. Operation avowedly palliative only.

CASE XVIII.—August 7, 1893; J. Israel, *Archiv für klinische Chirurgie*, 1894, Vol. xlvii, Heft 2. Female, twenty years. Clinical diagnosis, tuberculosis; bacilli found; patient pregnant. Pathological diagnosis, confirmatory. Oblique incision. Previous duration of case, two years. Results, recovered; a persistent fistula cured at home by injections of iodine. Safely confined November 27, 1893.

CASE XIX.—May 27, 1895; H. Braun, *Centralblatt für Krankheiten der Harn- und Sexual-Organen*, 1895, p. 449. Female, thirty-four years. Clinical diagnosis, tumor of kidney, ureter, and bladder ("Sackniere"), right side. Pathological diagnosis, tuberculosis; sac excised, size of child's head. "Bergmann's oblique incision." Previous duration of case, since last confinement, August, 1893. Results, recovery gratifying. On September 19, barring a persistent fistula, patient was completely well; had gained sixteen and a half pounds.

CASE XX.—April 24, 1880; J. Couper, *Medical Times and Hospital Gazette*, 1880, Vol. ii, p. 588. Female, eleven years. Clinical diagnosis, "strumous kidney dilated with pus." Pathological diagnosis, confirmatory. Nephrotomy followed by lumbar nephrectomy. Previous duration of case, almost one year. Results, reported well nine months after operation.

CASE XXI.—April 26, 1892; A. Baginsky, *Berliner klinische Wochenschrift*, 1892, p. 516. "Child," three years. Clinical diagnosis, perinephritic abscess and tuberculosis. Bacilli found; tuberculosis of bones and joints also present. Pathological diagnosis, confirmatory. Nephrectomy. Previous duration of case, "some time." Results, died

shortly after operation; other kidney not tubercular but acutely inflamed (parenchymatous nephritis).

CASE XXII.—June 3 and 12, 1884; W. Bruce Clarke, "Surgery of Kidney," London, 1886, p. 107. Male, fourteen years. Clinical diagnosis, pyonephrosis, cause apparently not determined. Pathological diagnosis, post mortem showed advanced tuberculous disease of right kidney; primary and isolated. Nephrotomy; no stone found. Previous duration of case, three months. Results, died one month later, pus discharging constantly.

CASE XXIII.—September 3, 1886; Von Muralt, *Correspondenzblatt für schweizer Aerzte*, 1887, p. 242. Male, thirteen years. Clinical diagnosis, hæmaturia, perinephritic abscess; bacilli never found. Pathological diagnosis, tuberculosis. Lumbar nephrectomy. Previous duration of case, (?). Results, recovery; patient in health some months afterwards.

CASE XXIV.—March 24, 1883; Von Muralt, *Correspondenzblatt für schweizer Aerzte*, 1884, p. 585. Female, ten years. Clinical diagnosis, perinephritic abscess; no family history of tuberculosis. Pathological diagnosis, tuberculosis of kidney; post mortem showed tuberculosis of ureter and bladder; lungs also scarred. Nephrectomy (nephrotomy done six months previously). Previous duration of case, almost one year. Results, patient died four weeks after operation, perforation of duodenum.

CASE XXV.—May, 1891; Schmid, *Münchener medicinische Wochenschrift*, 1892, p. 255. Male, twelve years. Clinical diagnosis, tuberculosis of kidney and perinephritic abscess. Pathological diagnosis, tuberculosis of kidney; post mortem showed tuberculosis of ureter and bladder; lungs also scarred. Nephrotomy and nephrectomy (great difficulties). Previous duration of case, five months. Results, quick recovery; well still, March, 1892.

CASE XXVI.—Duret, *Journal des Sciences médicales de Lille*, June, 1894, Vol. i, p. 592. Male, sixteen years. Clinical diagnosis, in doubt; calculus (?) Pathological diagnosis, huge purulent mass apparently thought tubercular; no explanations. Nephrectomy; much difficulty from large mass of tumor. Previous duration of case, not given. Results, still alive a month later; other kidney affected. Prognosis bad.

CASE XXVII.—Duret, *Journal des Sciences médicales de Lille*, June, 1894, Vol. i, p. 592. Male, eight years. Clinical diagnosis, calculus (?); large tumor. Pathological diagnosis, tuberculosis; no particulars. Nephrotomy, or rather incision of the tumor. Previous duration of case, at least half a year. Results, lost sight of.

CASE XXVIII.—Duret, *Journal des Sciences médicales de Lille*, June, 1894, Vol. i, p. 592. Male, age not given. Clinical diagnosis, tuberculosis. Pathological diagnosis, confirmatory; caverns found. Nephrectomy. Previous duration of case, not stated. Results, permanent recovery.

CASE XXIX.—January, 1890; Duret, *Journal des Sciences médicales de Lille*, June, 1894, Vol. i, p. 592. Female, young. Clinical diagnosis,

tumor of lumbar region. Pathological diagnosis, tuberculosis. Nephrotomy and curetting. Previous duration of case, not stated. Results, subsequent death from thoracic tuberculosis.

CASE XXX.—W. G. Nash, *Lancet*, 1894, Vol. ii, p. 1350. Male, thirty-nine years. Clinical diagnosis, "fluctuating swelling, left groin." Pathological diagnosis, "kidney riddled with tubercular abscesses." Nephrectomy. Previous duration of case, not stated. Results, recovered; "one and a quarter years afterwards weighed thirteen stone."

CASE XXXI.—W. G. Nash, *Lancet*, 1894, Vol. ii, p. 1350. Male, nineteen years. Clinical diagnosis, tubercular abscess of right kidney. Pathological diagnosis, "kidney riddled with tubercular abscesses." Drained and scraped; nephrectomy eighteen days later. Previous duration of case, not stated. Results, "recovered."

CASES XXXII-XXXIX (not separately described. Five were males, three females; ages from five years upward. Clinical diagnosis not specially mentioned. Previous duration of the cases, up to four and a half years).—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, died in one month and a half, pulmonary phthisis.

CASE XXXIII.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, died fourteenth day, pulmonary and intestinal tuberculosis and wound infection.

CASE XXXIV.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, died fifth day, acute necrosis of piece of gut.

CASE XXXV.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, died first day, peritonitis from bursting of a vertebral abscess.

CASE XXXVI.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, lived two years; died of tuberculosis elsewhere.

CASE XXXVII.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, alive and well (four years).

CASE XXXVIII.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, alive and well (two and a half years).

CASE XXXIX.—O. Hildebrand (from König's Klinik, Göttingen), *Deutsche Zeitschrift für Chirurgie*, 1894-95, Vol. xl, p. 146. Pathological diagnosis, tuberculosis. "Extirpation." Results, alive and well (three and a quarter years).

CASE XL.—May 21, 1894; L. Tansini, *Riforma Medica*, 1894, 4. p. 447. Male, thirty-three years. Clinical diagnosis, pyelonephrosis, probably tubercular (left side). Pathological diagnosis, same assured (inoculation tried, positive result). Nephrectomy. Previous duration of case, April, 1893. Results, recovery; remote result not stated.

CASE XLI.—Riedel, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206. Male, sixteen years. Clinical diagnosis, tuberculosis, left side. Nephrectomy. Previous duration of case, not stated. Results, persistent fistula; tuberculosis of bladder also present.

CASE XLII.—Riedel, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206. Male, thirty-four years. Clinical diagnosis, tuberculosis, left side. Nephrectomy. Previous duration of case, not stated. Results, tuberculin also injected. "Cured almost two years."

CASE XLIII.—Riedel, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206. Male, thirty-two years. Clinical diagnosis, tuberculosis, right side. Nephrectomy and several months later removal of left testicle for tuberculosis. Previous duration of case, not stated. Results, alive two years after the nephrectomy.

CASE XLIV.—Lehrecke, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206 (original not found). Male, eighteen years. Clinical diagnosis, tubercular pyonephritis, right side. Right nephrectomy with greatest difficulty (extraperitoneal). Previous duration of case, (?) Results, death in twenty-four hours from exhaustion; patient was much emaciated; blood and pus in urine.

CASE XLV.—Lehrecke, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206 (original not found). Male, thirty-six years. Clinical diagnosis, tuberculosis. Pathological diagnosis, pyelonephritis caseosa sinistra. Nephrectomy, extraperitoneal. Previous duration of case, (?) Results, death day after operation.

CASE XLVI.—Lehrecke, Schmitt's *Jahrbücher der Medicin*, 1894, Vol. ccxlv, p. 206 (original not found). Female, thirty-nine years. Clinical diagnosis, tuberculosis. Nephrectomy, extraperitoneal and partial ureterectomy. Previous duration of case, (?) Results, recovery.

CASE XLVII.—August 17, 1892; M. H. Richardson, *Boston Medical and Surgical Journal*, April 13, 1893. Female, twenty-five years. Clinical diagnosis, large tumor, right side; not proved tubercular. Pathological diagnosis, tuberculosis. Nephrectomy, transperitoneal. Previous duration of case, six months. Results, wound healed thirteen days after operation; some pus in bladder still.

CASE XLVIII.—M. H. Richardson, *Boston Medical and Surgical Journal*, April 13, 1893. Female, thirty-one years. Clinical diagnosis, stone suspected; tumor right side. Pathological diagnosis, tuberculosis. Nephrectomy, transperitoneal. Previous duration of case, five years. Results, complete recovery.

CASE XLIX.—September 8, 1896; B. Farquhar Curtis, *Annals of Surgery*, 1897, Vol. xxv, p. 173. Female, thirty-six years. Clinical diagnosis, probable tuberculosis, right kidney. Pathological diagnosis, confirmatory,—kidney large, disorganized, very adherent. Lumbar nephrec-

tomy; piece of duodenum torn out in extraction. Nephrotomy had been done a year before at St. Luke's Hospital. Previous duration of case, two years. Results, recovery; intestinal wound healed without discharge. Patient reported doing well November 11, 1896.

CASE L.—E. von Mayer (reporting Czerny), *Deutsche medicinische Wochenschrift*, 1893, p. 200. Female, eighteen years. Clinical diagnosis, right pyonephrosis; tuberculosis suspected (tuberculin injection temporarily occluded one ureter!) Pathological diagnosis, multiple cheesy abscesses. "Extirpation." Previous duration of case, history tubercular. Results, recovery smooth.

CASE LI.—April 25, 1893; Tuffier, *Annales des Maladies des Organes Génito-Urinaires*, 1893, Vol. xi, p. 495. Female, forty-two years. Clinical diagnosis, not made; paroxysmal hæmaturia for four years. Pathological diagnosis, "infective pus" and abscess cavities. Lumbar nephrectomy. Previous duration of case, four years. Results, in excellent condition five months after.

CASE LII.—June 27, 1891; Tuffier, *Archives générales de Médecine*, May, 1892, Vol. i, p. 515. Female, twenty-one years. Clinical diagnosis, tuberculosis of right side. Pathological diagnosis, double primary (solitary) renal tuberculosis. Nephrotomy. Previous duration of case, six weeks. Results, death from uræmia July 2 (six days after operation).

CASE LIII.—November 10, 1891; Tuffier, *Archives générales de Médecine*, May, 1892, Vol. i, p. 523. Male, eighteen years. Clinical diagnosis, tuberculosis, right side, seemingly primitive; probable involvement of ureter. Nephrotomy and secondary (lumbar) nephrectomy. Previous duration of case, several months. Results, December 3 patient left with fistula; general condition bad, suggesting an undiscovered focus elsewhere.

CASE LIV.—January 15, 1891; Tuffier, *Archives générales de Médecine*, May, 1892, Vol. i, p. 708. Female, forty-eight years. Clinical diagnosis, pyelonephritis; tuberculosis. Pathological diagnosis, confirmatory. Lumbar nephrectomy. Previous duration of case, four years. Results, seen well March 24, 1892.

CASE LV.—January 5, 1892; Tuffier, *Archives générales de Médecine*, May, 1892, Vol. i, p. 704. Female, twenty-eight years. Clinical diagnosis, tubercular nephritis. Pathological diagnosis, cystic and diffuse tuberculosis. Lumbar nephrectomy. Previous duration of case, more than two years. Results, recovery, persisting to date of report, which was published in May, 1892.

CASE LVI.—October 24, 1893; G. Naumann, *Hygiea*, Stockholm, 1894, Vol. lvi, p. 404. Male, four years. Clinical diagnosis, perinephritis; probable tubercular kidney. Pathological diagnosis, confirmatory. Lumbar nephrectomy. Previous duration of case, five months. Results, five months after operation (end of March, 1894) wound not yet fully closed; general state excellent.

CASE LVII.—Spring, 1888; J. P. Bryson, *Journal of Cutaneous and Genito-Urinary Diseases*, 1894, Vol. xii, p. 484. Male, forty-six years. Clinical diagnosis, tuberculosis; left renal colic, cystitis, etc.; bacilli

found. Pathological diagnosis, cheesy kidney. Lumbar nephrotomy. Previous duration of case, four years. Results, left hospital in five weeks. wound closed; bladder still troublesome fall of 1890; no return of renal symptoms.

CASE LVIII.—December 20, 1892; J. P. Bryson, *Journal of Cutaneous and Genito-Urinary Diseases*, 1894, Vol. xii, 484. Male, twenty-seven years. Clinical diagnosis, left renal colic; uro-genital tuberculosis. Exploratory nephrotomy; "kidney found normal on palpation and puncture;" ureter nodulated. Previous duration of case, nineteen months. Results, no marked improvement; under "antitubercular treatment" temporarily bettered; died of general infection February, 1894. Post mortem showed right kidney also considerably damaged (as reported by another physician).

CASE LXIX.—March 11, 1893; J. P. Bryson, *Journal of Cutaneous and Genito-Urinary Diseases*, 1894, Vol. xii, 484. Male, thirty-two years. Clinical diagnosis, abscess of right kidney; genito-urinary tuberculosis; bacilli found. Pathological diagnosis, extensive tuberculosis. Lumbar nephrotomy and washing. Previous duration of case, colic fourteen years. Results, died March 30; two small calculi in pelvis; other (left) kidney contained cheesy nodules; pelvis tubercular.

CASE LX.—W. Tauffer, *Pesther medicinisch-chirurgische Presse*, 1893, Vol. xxix, p. 1044, and *Archiv für Gynäkologie*, 1894, Vol. xlv, p. 581 (full account). Female, thirty-four years. Clinical diagnosis, primary tuberculosis and intermittent hydronephrosis. Pathological diagnosis, tuberculosis. Exploratory nephrotomy; at once followed by nephrectomy. Results, death from hæmorrhage and acute parenchymatous nephritis of other kidney.

CASE LXI.—August 3, 1892; P. Postempski, *Boll. d. real. Accad. Med. di Roma*, 1892-93, Vol. xix, p. 423. Female, forty years. Clinical diagnosis, tubercular pyonephrosis of right kidney. Pathological diagnosis, tuberculosis. Simon's lumbar incision. Previous duration of case, "some months." Results, recovery; case shown February 26, 1893.

CASE LXII.—January 14, 1892; Bordalto Pinheiro, *Medicina Contemporanea*, Lisbon, 1892, Vol. x, p. 161. Female, twenty-six years. Clinical diagnosis, suppurative tubercular pyelonephritis; purulent urine. Pathological diagnosis, tuberculosis. Lumbar operation. Results, died eleven days later; partial suppression of urine. Autopsy showed bladder to be ulcerated and covered with pus.

CASE LXIII.—A. Martin, *Centralblatt für Gynäkologie*, 1890, Vol. xiv, p. 403. Female, adult. Clinical diagnosis, tuberculosis. Abdominal nephrectomy. Previous duration of case, (?) Results, completely recovered for eight years; patient had best of care, residence in "cures," the South, etc.

CASE LXIV.—August 25, 1891; A. Barth, *Deutsche medicinische Wochenschrift*, 1892, Vol. xviii, p. 534. Male, thirty-one years. Clinical diagnosis, very obscure; bacilli looked for more than forty times in vain. Pathological diagnosis, "perfect example of tubercular kidney." Lumbar nephrectomy. Previous duration of case, two years. Results, in perfect health a year after; slow recovery; occasional albuminuria in traces.

CASE LXV.—Dumur, *Annales des Maladies des Organes Génito-Urinaires*, 1889, p. 573. Female, twenty years. Clinical diagnosis, tuberculosis; vesical tuberculosis also for some months before operation. Pathological diagnosis, advanced tubercular degeneration. Abdominal nephrectomy. Previous duration of case, some months. Results, died of shock in a few hours; patient in bad state at beginning.

CASE LXVI.—July, 1891; P. Swain, *Lancet*, May 21, 1892, p. 1132. Male, thirty-five years. Clinical diagnosis, renal calculus. Pathological diagnosis, tuberculosis. Nephrotomy, June 2; secondary nephrectomy July 3, 1891. Previous duration of case, two and a half years. Results, died of uræmia; post mortem showed left kidney atrophied.

CASE LXVII.—A. Rivière (from Professor Poncet's clinic), *Lyon Médical*, 1892, Vol. lxix, p. 288. Female, twenty-five years. Clinical diagnosis, calculous pyelitis; no suggestion of tuberculosis. Pathological diagnosis, typical "cavernous" tubercular kidney. "Paraperitoneal" nephrectomy. Previous duration of case, about two years. Results, not stated; recovery is to be inferred (?)

CASE LXVIII.—August 6, 1891; Polaillon, *Annales des Maladies des Organes Génito-Urinaires*, 1892, Vol. x, p. 32. Female, thirty-one years. Clinical diagnosis, tubercular pyelonephritis. Pathological diagnosis, tuberculosis. Lateral incision. Previous duration of case, six years. Results, last seen December, 1891. Recovered; general health excellent; fistula persistent; silk ligature found which broke on attempted extraction.

CASE LXIX.—May 15, 1891; L. Szuman, *Therapeutische Monatshefte*, 1892, p. 6. Male, twenty-four years. Clinical diagnosis, probable tubercular pyelonephrosis (by exclusion). Pathological diagnosis, tuberculosis. Simon's lumbar incision. Previous duration of case, August, 1890. Results, on August 15, 1891 (three months), patient in fine health; gained "twenty-five pfund;" urine clear.

CASE LXX.—June 29, 1893; D. Tait and N. Rosencrantz, *Occidental Medical Times*, 1893, Vol. vii, p. 615. Male, thirty-three years. Clinical diagnosis, primary tuberculosis; bacilli found. Partially successful ureteral catheterization. Pathological diagnosis, tuberculosis. Simon's lumbar incision. Previous duration of case, two years. Results, August 18 patient was doing well; gained six pounds.

CASE LXXI.—G. Naumann, *Hygiea*, Stockholm, 1892, Vol. liv, 2, pp. 49-51. Female, twenty-five years. Clinical diagnosis, tubercular (right) kidney with abscess of iliac fossa and lumbar region. Pathological diagnosis, tuberculosis. Nephrectomy, lumbar incision (border sacro-lumbalis muscle). Previous duration of case, three years. Results, patient died twelfth day, exhaustion and gangrene. (This case appears to have been hopeless from the beginning.)

CASE LXXII.—July 19, 1889; H. Morris, *British Medical Journal*, 1892, Vol. i, p. 896. Young woman. Clinical diagnosis, probable renal calculus; perhaps tubercular (right) kidney. Pathological diagnosis, general tubercular infiltration. Nephrectomy. Previous duration of case,

one year. Results, recovery from operation; death September, 1889, probably from phthisis; other kidney showed "several large cysts, surrounded by healthy substance; thorax and head not examined."

CASE LXXIII.—H. Morris, *British Medical Journal*, 1892, Vol. i, p. 896. Clinical diagnosis, multiple abscesses and pyelitis. Nephrotomy; two months later, nephrectomy. Previous duration of case, (?) Results, death third day; exhaustion; other kidney found healthy, but bladder, prostate, etc., tuberculous.

CASE LXXIV.—H. Morris, *British Medical Journal*, 1892, Vol. i, p. 896. Male, adult. Clinical diagnosis, multiple abscesses and pyelitis. Nephrotomy; worse; nephrectomy three days later. Previous duration of case, (?) Results, slow but steady recovery; fifteen months afterwards at his work and well; slight fistula persistent a year.

CASE LXXV.—H. Morris, *British Medical Journal*, 1892, Vol. i, p. 896. Male. Clinical diagnosis, marked symptoms of renal calculus; some stones passed previously. Pathological diagnosis, kidney large and nodulated; six cheesy cysts. Nephrotomy; cysts opened, cleaned, and iodoform dusted in; kidney replaced. Previous duration of case, (?) Results, recovery *per primam*.

CASE LXXVI.—September 21, 1888; July 4, 1890; B. Pitts, St. Thomas's Hospital Reports, 1892, N. S., Vol. xx, p. 237. Male, forty years. Clinical diagnosis, stones and pus passed; tumor palpable. Pathological diagnosis, "the appearance that of a typical tubercular kidney." Nephrotomy followed by nephrectomy two and a half years later. Previous duration of case, ten years. Results, recovered. December 14, 1891, in excellent health; small sinus still discharging pus.

CASE LXXVII.—March 22, 1890; C. Parkhill, *International Journal of Surgery*, New York, 1891, Vol. iv, p. 210. Male, twenty-five years. Clinical diagnosis, left kidney probably tubercular. Patient had recovered from phthisis. Pathological diagnosis, confirmatory microscopically. Lumbar nephrectomy. Previous duration of case, some months. Results, slow recovery; fistula persistent fifteen months afterwards, but general health good.

CASE LXXVIII.—December 15, 1889; January 9, 1890; W. G. Nash (Mr. Whipple), *Provincial Medical Journal*, Leicester, 1891, Vol. x, p. 457. Male, thirty-nine years. Clinical diagnosis, not stated; "swelling in the loin." Pathological diagnosis, kidney riddled with cheesy abscesses. Nephrotomy; secondary nephrectomy few weeks later. Previous duration of case, nine months. Results, patient, although critically ill at the time of operation, made rapid recovery; was the "picture of health" a year afterwards, and passed normal urine.

CASE LXXIX.—March 25, 1890; W. G. Nash (Mr. Whipple), *Provincial Medical Journal*, Leicester, 1891, Vol. x, p. 457. Male, twenty-four years. Clinical diagnosis, tuberculosis of left kidney and genito-urinary tuberculosis. Pathological diagnosis, confirmatory. Nephrotomy and abscess cavity drained. Previous duration of case, eighteen months. Results, March 31 died of "septicæmia;" kidney tissue of left side found gangrenous.

CASE LXXX.—February and March, 1891; W. G. Nash (Mr. Swain operated), Provincial Medical Journal, Leicester, 1891, Vol. x, p. 457. Male, eighteen years. Clinical diagnosis, not stated; hæmaturic onset; right kidney enlarged. Pathological diagnosis, many perinephritic abscesses. February 20, lumbar nephrotomy; hæmorrhage; nephrectomy few days later (March 10). Previous duration of case, one year. Results, "pyæmia;" slow recovery; had abscess of thigh and perineum, which were opened. In July, 1891 (four months), was greatly improved, using a crutch; small sinus in perineum.

CASE LXXXI.—October 31, 1889; F. T. Heuston, British Medical Journal, 1891, Vol. i, p. 114. Male, thirteen years. Clinical diagnosis, scrofulous disease of left kidney; bacilli not found; tubercular history. Pathological diagnosis, cheesy abscesses; giant-cells (microscope). Lumbar nephrectomy. Previous duration of case, (?) Results, discharged January 18, 1890, in good condition; no pain; urine normal.

CASE LXXXII.—May 29, 1896; J. W. White and A. C. Wood, Annals of Surgery, 1897, Vol. xxv, p. 25. Male, twenty-two years. Clinical diagnosis, tuberculosis of right kidney; tubercular history; lungs probably involved. Pathological diagnosis, confirmatory. Lumbar nephrotomy; shortly afterwards abdominal nephrectomy. Previous duration of case, two or three months. Results, recovery. Left hospital with small sinus; no discharge.

CASE LXXXIII.—March 5, 1889; F. Ris, Beiträge zur klinischen Chirurgie, 1890-91, Vol. vii, p. 135. Female, twenty-two years. Clinical diagnosis, left tubercular pyonephrosis. Pathological diagnosis, confirmatory. Lumbar nephrotomy. Previous duration of case, acutely ill five weeks. Results, discharged cured June 30, 1889.

CASE LXXXIV.—June 24, 1890; F. Ris, Beiträge zur klinischen Chirurgie, 1890-91, Vol. vii, p. 135. Female, thirty-one years. Clinical diagnosis, left tubercular pyonephrosis; lungs involved. Pathological diagnosis, confirmatory. Lumbar nephrectomy. Previous duration of case, since 1886. Results, as far as operation was concerned, doing excellently two months after, barring afternoon hectic (probably pulmonary).

CASE LXXXV.—July 16, 1890; F. Ris, Beiträge zur klinischen Chirurgie, 1890-91, Vol. vii, p. 135. Female, seventeen years. Clinical diagnosis, left tubercular pyonephrosis; large tumor; lungs involved. Pathological diagnosis, kidney a mass of cheesy tubercular abscesses. Lumbar nephrectomy. Previous duration of case, about two years; acute for two weeks. Results, August 8 patient in good condition; no fever; good granulations.

CASE LXXXVI.—February 28, 1891; W. D. Hamilton, Philadelphia Medical News, 1891, Vol. lix, p. 68. Male, thirty-six years. Clinical diagnosis, "scrofulous kidney," left side. Pathological diagnosis, "multiple abscesses; thick pus." Lumbar nephrectomy, preceded two months before by nephrotomy. Previous duration of case, since October, 1890. Results, reported in July, 1891, as doing well; no tuberculosis; no pus in the urine, which is abundant.

CASE LXXXVII.—November 12, 1889; Terrillon, *Bulletin et Mémoires de Société de Chirurgie de Paris*, 1891, N. S., Vol. xvii, p. 101. Female, twenty-five years. Clinical diagnosis, pyonephrosis and cystitis; patient in alarming state. Pathological diagnosis, suppurating tubercular kidney. Abdominal nephrectomy. Previous duration of case, September, 1889. Results, patient reported well end of January, 1891.

CASE LXXXVIII.—April 3, 1890; W. B. Coley, *New York Medical Journal*, 1891, Vol. liii, p. 476. Female, thirty years. Clinical diagnosis, tubercular pyonephrosis, right side. Pathological diagnosis, numerous cavities; typical giant-cells. Lumbar nephrectomy. Previous duration of case, two years. Results, died forty hours after operation. Adhesions so firm that in spite of greatest care a rent was made in inferior vena cava.

CASE LXXXIX.—February, 1884; J. K. Thornton, *Medical Press and Circular*, 1889, Vol. ii, p. 598. Female, twenty-three years. Clinical diagnosis, suspected tuberculosis. Pathological diagnosis, tubercles (?) under the capsule. Nephrotomy; drainage. Previous duration of case, three years. Results, rapid recovery; well five years after.

CASE XC.—July 21, 1896; J. H. Adams, *Glasgow Medical Journal*, 1897, Vol. xlvii, p. 23. Female, twenty-eight years. Clinical diagnosis, tumor (right side), nature not determined; bacilli not found. Pathological diagnosis, kidney and ureter tubercular. Anterior median incision; both kidneys explored; then right lumbar nephrectomy; ureters not extirpated. Previous duration of case, about five years. Results, November 6 patient much better, moving about ward; still some albumen in urine.

CASE XCI.—H. W. Maunsell, *Transactions of the Intercolonial Medical Congress of Australasia*, 1888, Vol. i, p. 14 (original not found). Clinical diagnosis, scrofulous pyelonephritis. "Langenbeck's incision, lumbar drainage." Results, recovery.

CASE XCII.—January 25, 1888; I. Svensson, *Hygiea*, Stockholm, 1889, Vol. li, p. 193. Female, twenty-five years. Clinical diagnosis, not stated; no tubercular history or symptoms elsewhere in parents or self. Pathological diagnosis, section showed cheesy, tuberculous, partly liquefied masses. Lumbar nephrectomy. Previous duration of case, fall of 1886. Results, more than a year afterwards doing well.

CASE XCIII.—October 16, 1888; H. T. Rawdon, *Liverpool Medico-Chirurgical Journal*, 1889, Vol. ix, p. 227. Female, thirty-seven years. Clinical diagnosis, perinephritic abscess. Pathological diagnosis, kidney enlarged; cheesy abscesses. Lumbar nephrectomy, preceded some months before by nephrotomy. Previous duration of case, nearly two years. Results, discharged, cured, March 4, 1889.

CASE XCIV.—August 6, 1885; A. G. Miller, *Edinburgh Medical Journal*, 1887-88, Vol. xxxiii, p. 1068. Female, twenty-two years. Clinical diagnosis, tuberculosis; waxy liver. Pathological diagnosis, kidney enlarged; cheesy abscesses. Lumbar nephrotomy. Previous duration of case, not stated; apparently long. Results, lived, at first with much

improved general condition, till March 26, 1886; died of hectic and uræmia. Fistula never closed, discharging urine till death.

CASE XCV.—December 26, 1896; J. O. Polak, unpublished. Female, twenty-eight years. Clinical diagnosis, right pyonephrosis and ureteritis; vesical tuberculosis; large quantities of pus, blood, and urine; Koch's bacilli in abundance. Pathological diagnosis, entire secreting portions were destroyed and infiltrated with pus. Lumbar nephrectomy. König's incision. Time, thirty-five minutes. Wound sutured and drained. Previous duration of case, diagnosis sixteen months prior to operation. Supposed to have existed before that. Results, died of acute uræmia five days after operation, renal secretion being only temporarily re-established by intravenous infusion.

CASE XCVI.—1885; W. T. Belfield, unpublished. Male, sixty-three years. Clinical diagnosis, either tuberculosis or calculus. Pathological diagnosis, tuberculosis. Nephrotomy. Previous duration of case, probably three years, perhaps more. Results, death from uræmia on tenth day. Partial autopsy revealed complete destruction of other kidney by tuberculosis. Had never had symptoms on that side.

CASE XCVII.—1887; W. T. Belfield, unpublished. Male, twenty-eight years. Clinical diagnosis, tuberculosis; prostate and epididymis involved. Pathological diagnosis, tuberculosis. Nephrotomy. Previous duration of case, several years. Results, recovered. Immediate relief from vesical irritation in considerable degree. Died eleven months later; no autopsy.

CASE XCVIII.—1888; W. T. Belfield, unpublished. Male, thirty-seven years. Clinical diagnosis, tuberculosis, left kidney. Pathological diagnosis, tuberculosis. Nephrotomy. Permanent drainage by soft rubber tube carried into bottle in patient's pocket. Previous duration of case, probably eight years. Results, recovered. Almost complete relief from extreme irritation of bladder; great improvement in general health; resumed profession. Died about two years later,—probably pulmonary tuberculosis.

CASE XCIX.—November 17, 1891; A. J. McCosh, unpublished. Female, forty-two years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tuberculosis of kidney. Nephrectomy. Previous duration of case, not stated. Results, death, tenth day, uræmia. Other kidney in advanced stage of tuberculosis,—also bladder and glands.

CASE C.—April, 1892; A. J. McCosh, unpublished. Female, twelve years. Clinical diagnosis, probably tubercular kidney. Pathological diagnosis, tubercular abscess of kidney. Nephrotomy. Previous duration of case, not stated. Results, recovery with urinary fistula. Nine months later nephrectomy done in Buffalo, N. Y., followed by death.

CASE CI.—November, 1893; A. J. McCosh, unpublished. Male, thirty-two years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tubercular kidney. Nephrectomy. Previous duration of case, not stated. Results, alive a year later. No further record.

CASE CII.—December 27, 1895; A. J. McCosh, Presbyterian Hospital Reports, New York, 1897, Vol. ii. Female, thirty-two years. Clini-

cal diagnosis, tubercular kidney. Pathological diagnosis, tubercular kidney. Nephrectomy. Previous duration of case, not stated. Results, recovered. April, 1897 (one and a quarter years later), considered herself well. No personal examination.

CASE CIII.—October 25, 1895; A. J. McCosh, Presbyterian Hospital Reports, New York, 1897, Vol. ii. Female, twenty-nine years. Clinical diagnosis, tubercular kidney. Pathological diagnosis, tubercular kidney. Nephrectomy. Previous duration of case, not stated. Results, recovered. April, 1897 (one and a half years later), alive, and, on personal examination, apparently well. Gain of twenty-eight pounds.

CASE CIV.—December 3, 1896; A. J. McCosh, Presbyterian Hospital Reports, New York, 1897, Vol. ii. Female, thirty-three years. Clinical diagnosis, tubercular kidney. Pathological diagnosis, tubercular kidney. Nephrectomy. Previous duration of case, not stated. Results, recovered. April, 1887, had gained eighteen pounds (four months later).

CASE CV.—October 17, 1895; L. M. Tiffany, unpublished. Female, thirty-nine years. Clinical diagnosis, tumor of gall-bladder or kidney. Pathological diagnosis, general tuberculosis of kidney,—no suppuration. Abdomen opened over tumor in front, then transverse incision. Nephrectomy, peritoneum sutured. Previous duration of case not known, but pulmonary tuberculosis present a number of months previous. Results, recovered. Wound closed quickly. Died some months later from tuberculosis.

CASE CVI.—November 9, 1895; L. M. Tiffany, unpublished. Male, twenty-eight years. Clinical diagnosis, tuberculosis or calculus of kidney. Pathological diagnosis, tuberculosis. Nephrectomy. Tubercular focus freely opened, curetted, and filled with iodoform. Incision parallel with last rib. Previous duration of case, eighteen months. Results, recovered. A sinus discharging urine remained, with pain in scar and at times in penis. Gain of twenty pounds.

CASE CVIa.—June, 1896; L. M. Tiffany, unpublished. Same patient. Pathological diagnosis, two small tubercular foci found in kidney distant from first scar. Nephrectomy, transverse and vertical incision. Results, recovered; excellent health since (to April, 1897, one and a quarter years from first, ten months from second operation).

CASE CVII.—August 25, 1896; F. Tilden Brown, New York Medical Journal, 1897, Vol. i, p. 447. Male, fourteen years. Clinical diagnosis, renal tuberculosis. Pathological diagnosis, renal tuberculosis. Oblique lateral extraperitoneal incision. Previous duration of case, more than two years. Results, recovered; wound closed end of five weeks; had gained twenty pounds in that time. Continued to improve until five months after operation, when symptoms of meningitis developed. Autopsy showed tubercular meningitis; other kidney was not diseased.

CASE CVIII.—March 17, 1894; R. F. Weir, unpublished. Female, nineteen years. Clinical diagnosis, tuberculosis of kidney. Pathological diagnosis, confirmatory. Abdominal nephrectomy. Previous duration of case, three months. Results, death in four weeks, uræmia.

CASE CIX.—December 23, 1894; January 5, 1895; R. F. Weir, un-

published. Female, twenty years. Clinical diagnosis, abscess of kidney. Pathological diagnosis, tuberculosis. Lumbar nephrotomy; lumbar nephrectomy. Previous duration of case, eighteen months. Results, death in three months, extension of tuberculosis.

CASE CX.—October 30, 1895; R. F. Weir, unpublished. Male, twenty-two years. Clinical diagnosis, abscess of kidney. Pathological diagnosis, abscesses of kidney, probably tubercular. Lumbar nephrectomy. Previous duration of case, five years. Results, recovered. Doing hard work without pain fifteen months later.

CASE CXI.—June 12, 1896; November 25, 1896; R. F. Weir, unpublished. Male, forty-four years. Clinical diagnosis, tuberculosis of bladder and kidney. Pathological diagnosis, confirmatory. Resection of portions of bladder. Lumbar nephrotomy and nephrectomy. Previous duration of case, two and a half years. Results, "improved."

CASE CXII.—September 24, 1896; December 31, 1896; R. F. Weir, unpublished. Female, twenty-seven years. Clinical diagnosis, abscess of kidney. Pathological diagnosis, tuberculosis of kidney. Lumbar nephrotomy; lumbar nephrectomy. Previous duration of case, several years. Results, recovered, "cured."

CASE CXIII.—October 6, 1896; Carl Beck, unpublished. Male, thirty-two years. Clinical diagnosis, pyelitis. Pus from right ureter obtained by Casper's instrument. The orifice was covered with pus. Pathological diagnosis, miliary tubercles in the pelvis as well as in the kidney throughout. In some portions total destruction; cheesy formation. Simon's lumbar incision; resection of eleventh and twelfth ribs. Previous duration of case, about nine months. Results, recovered. Up to date (May, 1897) absolutely normal. Slight pain complained of sometimes in the left lumbar region (seven months later).

CASE CXIV.—June 4, 1895; Carl Beck, unpublished. Female, twenty years. Clinical diagnosis, cystoscopy, Kelly's method, revealed pus from right ureter; bacilli found; bladder ulcerated. Pathological diagnosis, mucous membrane of pelvis thickened; ulcerated at several points; cheesy foci in the kidney. Simon's lumbar incision. Previous duration of case, sick for about one year. Results, recovered. Patient reported well (one and a half years later) in January, 1897.

CASE CXV.—October 17, 1895; Charles P. Noble, unpublished. Female, thirty-four years. Clinical diagnosis, tubercular abscess in kidney. Pathological diagnosis, mucous membrane of pelvis thickened; ulcerated at several points; cheesy foci in the kidney; perinephritic abscess with sinus along spine; perirenal tissues thoroughly infected. Abdominal nephrectomy (abscess in back opened previous August, 1895, leaving a persistent sinus). Previous duration of case, not stated. Results, recovered. Patient has gained forty pounds, and feels well. A small sinus persists (May, 1897, one and a half years after).

CASE CXVI.—April 16, 1896; Charles P. Noble, unpublished. Female, about thirty-four years. Clinical diagnosis, tubercular abscess of kidney. Pathological diagnosis, confirmatory. Lumbar nephrectomy. Patient very septic at time of operation. Evening temperature 103° or

104° F. for weeks. Previous duration of case, not stated. Results, recovered. Had severe crural phlebitis after operation. Quite well, May, 1897 (thirteen months later).

CASE CXVII.—September 12, 1891; F. H. Markoe, unpublished. Male, thirty-three years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tuberculosis. Abdominal nephrectomy. Previous duration of case, about two years. Results, died. Nephrectomy was a last resort. Previous epicystotomy had been done by another surgeon, because of faulty diagnosis.

CASE CXVIII.—December 9, 1892; F. H. Markoe, unpublished. Female, twenty years. Clinical diagnosis, pyonephrosis; previous nephrotomy by another surgeon. Pathological diagnosis, tuberculosis. Abdominal nephrectomy. Patient very emaciated and feeble; pronounced hectic. Previous duration of case, four months. Results, recovered. Good health, May, 1897 (four and a half years).

CASE CXIX.—January 18, 1894; December 14, 1894; F. H. Markoe, unpublished. Male, forty-three years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tuberculosis. Nephrotomy (January 18); abdominal nephrectomy (December 14, 1894). Previous duration of case, nephrotomy, one year; nephrectomy, two years. Results, improved temporarily. Nephrectomy, as a last resort, resulted in death. Patient had emphysema and degenerate heart and vessels.

CASE CXX.—January and March, 1894; F. H. Markoe, unpublished. Male, twenty-six years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tuberculosis. Nephrotomy (January). Abdominal nephrectomy (March, 1894). Previous duration of case, seven years. Results, death, disseminated tuberculosis. Nephrectomy was refused by attending physician when nephrotomy was done.

CASE CXXI.—January 17, 1895; F. H. Markoe, unpublished. Male, thirty-two years. Clinical diagnosis, pyonephrosis; previous nephrotomy by another surgeon. Pathological diagnosis, tuberculosis. Abdominal nephrectomy. Previous duration of case, eleven months. Results, recovered. One year later greatly improved in health and strength; small sinus remaining.

CASE CXXII.—May 22, 1896; F. H. Markoe, unpublished. Female, thirty-seven years. Clinical diagnosis, pyonephrosis. Pathological diagnosis, tuberculosis. Nephrotomy. Previous duration of case, not stated. Results, improved. Nephrectomy subsequently done by another surgeon with recovery.

CASE CXXIII.—Fall (?) 1894; J. W. White and A. C. Wood, *Annals of Surgery*, January, 1897, Vol. xxv. Female, twenty-seven years. Clinical diagnosis, renal or perirenal abscess. Pathological diagnosis, thought to be tuberculosis. Nephrotomy. Previous duration of case, some months at least. Results, recovered. Well, fall of 1896 (two years later).

CASE CXXIV.—May 4, 1896; J. W. White and A. C. Wood, *Annals of Surgery*, January, 1897, Vol. xxv. Male, sixteen years. Clinical diagnosis, abscess of kidney. Pathological diagnosis, "pus of distinctly

tuberculous appearance." Nephrotomy. Previous duration of case, two months. Results, recovered. Well, October, 1896 (six months later).

CASE CXXV.—May, 1896; Gangolphe, Lyon Médical, 1897, Vol. lxxv, p. 197. Neither age nor sex stated. Clinical diagnosis, renal tuberculosis; lungs free. Pathological diagnosis, confirmatory. Subcapsular nephrectomy. Previous duration of case, not stated. Results, recovered. Patient to all appearances well a year later. Still some dysuria. Gain of fifteen to twenty kilogrammes.

CASE CXXVI.—February 3, 1890; H. Bräuninger, Beiträge zur klinischen Chirurgie, 1897, Vol. xviii, p. 448. Female, thirty years. Clinical diagnosis, renal tuberculosis, left side; tumor size of a child's head. Pathological diagnosis, confirmatory. Oblique lumbar nephrotomy. Previous duration of case, two and a half-years. Results, died in three weeks. Post mortem showed tuberculosis of kidney, ureter, and bladder, purulent peritonitis (from bursting of perinephritic abscess), double empyema.

CASE CXXVII.—November 2, 1893; February 8, 1894; H. Bräuninger, Beiträge zur klinischen Chirurgie, 1897, Vol. xviii, p. 488. Female, twenty-six years. Clinical diagnosis, renal tuberculosis, right side. Pathological diagnosis, confirmatory. Nephrotomy (November); nephrectomy (February): both lumbar; oblique incision. Previous duration of case, several months. Results, recovered,—very slowly. Well, October, 1896 (three years later). One successful confinement. Abdominal hernia.

CASE CXXVIII.—December 29, 1893; March 24, 1894; H. Bräuninger, Beiträge zur klinischen Chirurgie, 1897, Vol. xviii, p. 488. Female, forty-three years. Clinical diagnosis, tubercular abscess, left kidney; bacilli found. Pathological diagnosis, confirmatory. Nephrotomy (December); nephrectomy (March): lumbar incision. Previous duration of case, more than a year. Results, died, two days after second operation. Post mortem showed right kidney not tubercular but *nephritic*. Apex of left lung cheesy.

CASE CXXIX.—September 6, 1895; H. Bräuninger, Beiträge zur klinischen Chirurgie, 1897, Vol. xviii, p. 488. Male, twenty-one years. Clinical diagnosis, tuberculosis, left kidney; large, slightly bulging, non-fluctuating mass. Pathological diagnosis, numerous small tubercular abscesses. Oblique lumbar nephrectomy. Previous duration of case, two years. Results, recovered. Completely well, October, 1896 (thirteen months later).

CASE CXXX.—April 30, 1896; H. Bräuninger, Beiträge zur klinischen Chirurgie, 1897, Vol. xviii, p. 488. Female, forty-six years. Clinical diagnosis, tuberculosis, right kidney; bacilli found. Pathological diagnosis, tuberculosis; cheesy abscesses. Oblique lumbar nephrectomy. Previous duration of case, sixteen months. Results, recovered. Except a small fistula, quite well, October, 1896 (six months later).

CASE CXXXI.—June 30, 1896; Willy Meyer, Medical News, New York, May 1, 1897. Female, thirty-nine years. Clinical diagnosis, primary descending tuberculosis of right kidney; catarrh of bladder. Path-

ological diagnosis, tuberculous pyelonephritis, with suppuration. Nephrectomy. Previous duration of case, nine months. Results, recovered; all trouble ceased at once. September, 1897 (one and a quarter years later), no bacilli in urine.

CASE CXXXII.—December 29, 1896; Willy Meyer, unpublished. Female, thirty-one years. Clinical diagnosis, primary descending tuberculosis, left kidney; catarrh of bladder. Pathological diagnosis, tuberculous pyonephrosis. Nephrectomy. Previous duration of case, six and a half years. Results, recovered. September, 1897 (nine months after), in perfect health; gained over thirty pounds.

CASE CXXXIII.—September 20, 1897; Willy Meyer, unpublished. Male, forty-one years. Clinical diagnosis, primary descending tuberculosis, left kidney; catarrh of bladder; probable affection of right kidney. Pathological diagnosis, suppurative tuberculous pyelonephritis. Nephrectomy. Previous duration of case, one year. Results, recovered. Much improved at date of report, few weeks later.

CASE CXXXIV.—June 8, 1896; Willy Meyer, unpublished. Male, twenty-six years. Clinical diagnosis, tuberculosis, right kidney; catarrh of bladder. Pathological diagnosis, tuberculosis; numerous abscesses. Nephrectomy. Previous duration of case, four years. Results, died of shock one hour after operation. Hæmorrhage at end of operation through slipping of ligature around renal vessels; saline infusion.

CASE CXXXV.—June 18, 1896; Willy Meyer, unpublished. Female, twenty years. Clinical diagnosis, pyonephrosis of left kidney. Pathological diagnosis, tuberculous pyonephrosis. Nephrectomy. Previous duration of case, one year. Results, improved much. Eight months later pyonephrosis of right kidney; nephrotomy; death.

TREATMENT OF ACROMIO-CLAVICULAR DISLOCATION.

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DISLOCATION of the acromio-clavicular articulation is usually described as a dislocation of the acromial end of the clavicle, but following the usual nomenclature of dislocations it would more rightly be termed a dislocation of the acromion process of the scapula, the distal bone being the one usually spoken of as the bone dislocated.

In the great majority of dislocations of this joint the acromion process is displaced downward and inward beneath the clavicle, the outer end of the latter bone riding on the top of the acromion, and the instances are very few where dislocation of the acromion takes place upward with the clavicle engaged beneath the process. This fact is readily explained when one studies the structure of the joint and the character of the injury usually received. The articular ends of the bones are simply two small plane surfaces that are held in apposition by a capsular ligament which completely surrounds the articular margins, but which is so lax in all positions of the joint that the acromion is not tightly braced to the clavicle. This provision of laxity of the capsular ligament permits of a fair range of motion of the scapula upon the clavicle as the former glides upon the thorax, not only in the forward and backward and upward and downward movements, but also in a rotary direction, which is called for in the complex movements of the upper extremity. As the joint is superficially placed, some protection is given to it by the

aponeurosis of the trapezius and deltoid muscles, the fibres commingling with those of the upper surface of the ligament, while beneath the clavicle is firmly bound down to the coracoid process by the short conoid and trapezoid ligaments, which have, however, no relation to the joint proper.

In all motions in which the shoulder is engaged, the scapula moves upon the outer end of the clavicle, the latter moving in unison upon the sternum, the function of the acromio-clavicular joint being principally to preserve the obliquely forward direction of the glenoid cavity. That is, if there was no such joint, when the scapula slid forward on the thorax the glenoid cavity and shoulder-joint would point inward, and when the scapula slid backward the shoulder-joint would point outward. The joint, therefore, governs the various movements of the scapula, and keeps the glenoid cavity, at all times, in a forward position. But in accomplishing this preservation of uniformity of position of the shoulder there is but a small—edge to edge, so to speak—articular surface of each bone on which the function solely depends, and when certain forms of injury are brought to bear upon the joint,—injuries to which the articulation is always exposed from its superficial relations and its position in the body,—a disturbance of these meagre joint relations, or dislocation, is easily brought about.

The injury that may produce a luxation of this articular union is a blow of sufficient force on the back or the shoulder, as, for example, a heavy weight falling from above and striking the shoulder when the body is bent forward, or the participation in an accident in which the body is hurled forcibly, striking the back or the shoulder against some solid object. If the blow lands on the front of the shoulder, a fractured clavicle usually results, whereas if the blow is struck posteriorly, over the acromion or spine of the scapula, the dislocation under consideration is what generally takes place. A blow over this particular area is, however, somewhat infrequent, which accounts for the fact that in the vast majority of cases the blows which the shoulder sustains more generally

result in a fracture of the collar-bone. The injury is, however, of sufficient frequency to make it one of the surgical pathological phenomena for which the practitioner must be constantly on the look-out.

The recognition of the luxation is not a matter of serious study, and yet it presents, on first sight, a deformity so akin to that of a dislocation of the humerus forward that an unpractised eye may have some difficulty in exactly determining the precise lesion. The rotundity of the shoulder will be destroyed, and the projection of the overriding clavicle may be mistaken for the apparent projection of the acromion in shoulder-joint dislocation. When, however, it is remembered that the shoulder-joint is depressed but that its motion is not seriously curtailed,—*i.e.*, it is not rigid; that the shoulder-joint is carried slightly forward and inward; that the hand of the injured side may easily be carried to the shoulder of the sound side when the elbow is on the chest; that by following the line of the clavicle the normal relations of this bone with the acromion are disturbed, the clavicle being on top; that there is no marked fossa above the head of the humerus; and that the projection of the clavicle is fully one inch within the line of the humerus,—one cannot fail to recognize the actual condition.

The treatment of the luxation will necessarily consist in reduction, and retaining the limited articular surfaces in position until union of the torn capsular ligament is established. The former is usually easy, the latter most difficult. Reduction can be effected by pushing upward and outward on the arm, which raises the glenoid cavity and scapula, and by manipulation pressing down the overriding end of the clavicle into its normal position and relation with the acromion. This may be done with or without anæsthesia according to the pain-resisting powers of the patient.

The retention of the bones in position now becomes a matter of some difficulty. Desault's dressing is usually recommended, but it proves inadequate for the purpose, the deformity being resumed after the lapse of a few hours, when

bandages have stretched and muscles are relaxed. Stimson's adhesive plaster dressing has the disadvantage of causing erosion of the skin in most patients before ligamentous union takes place, which erosion at least is a source of great annoyance, and the test of the efficiency of the method as a curative agent is rendered rather dubious by the information which accompanies the description; "Recurrence can be readily detected through the plaster by the finger or the eye." In fact, some text-books even go so far as to say the retention of the bone in place after reduction presents so many difficulties that it is not worth while to attempt it; to this, however, we could not rightfully acquiesce; a method of treatment which has answered admirably in the writer's hands seems to meet all the requirements for obtaining a satisfactory result, and the application may be set forth in the following case:

H. H., aged forty-five years, of strong muscular development. Sent by Dr. Eugene Reade, of Atlantic City. While the patient was driving in a carriage the horse became unmanageable and ran away, upsetting the vehicle and hurling its occupant out into the road. He struck the earth forcibly with the upper and back part of his right shoulder, and when found was suffering with a marked deformity of the shoulder, bruises at different parts of the body, severe pain, and shock. A temporary dressing was applied to the shoulder and the patient was sent to this city in the writer's care on the following day. On examination there was found considerable swelling, but not sufficient to occlude a marked prominence of the outer end of the clavicle, the acromion could not be felt, and the shoulder was depressed and approximated to the middle line of the body. There was also an apparent lengthening of the right arm.

The patient suffered such intense pain that I decided to give him an anæsthetic to effect the reduction, and determine at the same time if there was any fracture associated with the luxation. I called to my assistance Dr. J. C. Brick, and while he anæsthetized the patient the reduction was effected by the aid and advice of Dr. J. Chalmers Da Costa, no other lesion being found. A pad was placed in the axilla, and a Desault bandage

applied. The following day it was found that the deformity had reappeared, and, on being reduced by manipulation, the same dressing was reapplied more tightly. This, too, failed to keep the bones in position, and the patient complained of the pain from the tight dressing. Other dressings were then applied according to prescribed methods, and each day the deformity was found to persist. At the end of a week, in conversation with Dr. Da Costa regarding the case, it was suggested that a strap fastened over the shoulder and drawn as tightly as the patient could stand might prove capable of holding the bones in place, and after again reducing the dislocation and holding the bones in position, the writer applied the dressing as shown in Fig. A.

A wedge-shaped pad of absorbent cotton rolled in a towel was placed under the arm, the apex of the pad being pressed firmly into the axilla. A folded towel of heavy texture was placed across the shoulder so as to make it possible to exert pressure over a broad area at the site of injury, and a strap two inches wide (an ordinary trunk-strap was used in this instance) was thrown across the shoulder and under the elbow, and tightened. A pad of absorbent cotton prevented too great pressure on the elbow where the strap crossed. The strap was drawn as tightly over the shoulder as the patient could well bear, the point where pressure was exerted being internal to the joint,—*i.e.*, between the articulation and the root of the neck,—so as to control both the scapula and the clavicle, and the trapezius muscle, without causing the pain of pressure directly over the site of injury. A single retaining bandage passed under the opposite axilla prevented the strap from slipping off the shoulder. As will be readily seen from the illustration, the placing of the wedge-shaped pad under the arm, with the broad base downward, made it possible to exert pressure on the arm in the line which would do the most good,—upward, outward, and backward, raising the glenoid cavity and with it the scapula, while the clavicle was pushed downward by the same force, and thus prevented from again riding up over the acromion. A roller bandage around the chest anchored the arm and elbow to the side, the buckle of the strap not being covered in, so that the strap could be tightened, if necessary, without disturbing the rest of the dressing. (Fig. B.)

The skin was prevented from being irritated by strips of



FIG. 1.—Showing the dressing after reduction.



FIG. 2.—Bandage applied, with arm and elbow anchored to side.

cotton properly placed. As the patient became accustomed to the pressure, and the shoulder pad felt somewhat loose on the day following the application, the strap was drawn several holes tighter, the bones being found, however, to have remained in good position during the intervening twenty-four hours. This dressing was kept *in situ* for a week, the parts being examined daily to see that the bones had not slipped. At the end of a week, a hand was inserted under the shoulder pad and the bones firmly held, the arm being held in a fixed position by an assistant, while the entire dressing was removed and the skin surface bathed. The dressing was reapplied weekly after this for two weeks longer, at the end of which time it was discarded altogether, and a spica of the shoulder substituted for still another week. All dressings were then withheld. Some pain was experienced on the side of the neck after the original dressing was discarded, which was likely due to some injury to the nerves constituting the cervical plexus at the time of the accident. This disappeared on massaging the parts daily for several weeks, and the patient is now in excellent condition, having full use of his arm, without any pain or deformity in the shoulder. The good result obtained in this case, and the simplicity of the application, would tend to recommend the method as a suitable one in the treatment of this refractory lesion.

NOTE ON THE REPAIR OF WOUNDS OF THE URETER.

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OWING to the deep situation of the ureters at the back of the abdominal cavity, and within the pelvis, traumatism of these tubes from without occur very seldom, but in the development of pelvic tumors, the ureters not unfrequently become displaced, and accidental injuries during the performance of laparotomy are occasionally inflicted upon them. Up to a few years ago the wounding of the ureters was regarded as one of the most serious accidents that could befall the patient, and resulted either in death or the formation of an urinary fistula, and the treatment recommended was immediate extirpation of the corresponding kidney or the formation of a fistula on the skin or in the vagina. Attempts to suture ureteral wounds did not meet with much success, until Van Hook published his method of lateral implantation in 1893, since which time several successful anastomoses of divided ureters have been reported. My personal experience is limited to one case, in which the ureter was completely divided transversely, and, in addition, I wish to refer to a case of partial transverse division occurring in the practice of my colleague, Professor Hundley, who kindly permits me to report it.

CASE I.—*Partial Division of the Left Ureter; Suture; Recovery.* L. S., aged forty-eight years, by occupation a cook and laundress, was admitted to the University Hospital on June 8,

1896, suffering with multiple uterine myomata, for which Professor Hundley performed hysterectomy on June 23. During the division of the broad ligament the left ureter was cut, but not completely divided, and the wound was at once sutured and the uterus extirpated. The patient had no febrile reaction, the temperature for the first two weeks not reaching higher than $99\frac{2}{3}^{\circ}$ F., and the pulse generally from 60 to 76 beats per minute. In

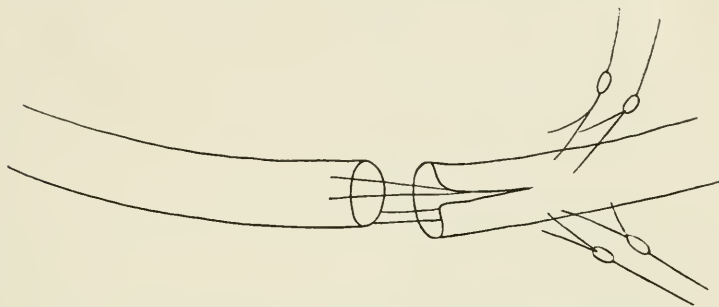


FIG. 1.—Lower end of ureter incised, with traction sutures in position.

the first twenty-four hours the kidneys secreted thirty-four ounces, and subsequently eighteen to twenty ounces daily. At the end of a month the urinary discharge was from forty to sixty ounces daily. In about two weeks a slight rise of temperature occurred, and some infiltration was felt in the left broad ligament, which was incised from the vagina, giving exit to some fluid of an urinous odor. The cavity was drained, and the patient made a good recovery.

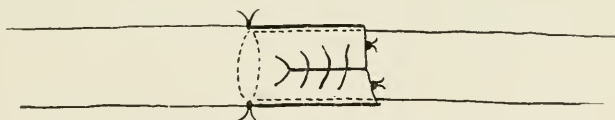


FIG. 2.—Invagination complete, sutures introduced.

CASE II.—*Complete Transverse Division of the Right Ureter; Suture; Recovery.* N. K., colored, aged thirty-four years, was referred to me by Dr. J. H. McMullan, of Edenton, N. C., and was admitted to the University Hospital on June 10, 1897. She is a well-developed woman, who appears to have enjoyed fair health, and who is now healthy with the exception of a large and rapidly growing tumor in the lower abdominal region, which was

judged to be a soft myoma of the uterus, or a fibrocyst. This tumor was first noticed by the patient about three years ago, and has grown rapidly in the past year. Examination of the vaginal secretions showed gonococci,—urine about normal.

On June 16, 1897, I extirpated the uterus, which weighed fifteen pounds three ounces, leaving only the stump of the cervix, which was covered with peritoneum and dropped. The tumor was a soft myoma with a few small cysts. During the division of the right broad ligament the ureter of that side was accidentally divided, probably from having been displaced by the growth. The point of division was in the pelvis, and some inches from the bladder. After removing the uterus, my attention was devoted to the repairing of the divided ureter. A slit was made into the lower portion, and the upper part was invaginated into the lower by two traction sutures, which were made to transfix the walls of the lower part. After the invagination was complete, the traction sutures were tied and cut short. The slit portion of the tube was now brought around the upper portion and sutured, and a few additional sutures were placed around the exposed cut edges. When completed the anastomosis seemed to be very secure. The subsequent course was uneventful, the temperature rose to $101\frac{2}{3}^{\circ}$ F. the next evening, dropping to $98\frac{3}{8}^{\circ}$ in forty-eight hours. The pulse varied from 60 to 96, remaining usually about 80 per minute. During the first twenty-four hours thirty-seven ounces of urine were passed, in the second, thirty-two ounces, and in a week from sixty to seventy ounces were passed daily. She had no pain and but little discomfort of any kind, and left the hospital well on July 27.

THE STERILIZATION OF CATGUT BY THE JEFFERSON METHOD.

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So much has been written on the sterilization of catgut that it seems almost a work of supererogation to add to its literature. My only reason for doing so is that the method very briefly described in this paper is so simple, so efficacious, and so reliable that, though it has been already published, it seems desirable to call the attention of the profession to it anew.

Very many of the methods of sterilization, such as by heat, by the use of cumol, alcohol, etc., require special apparatus and a good deal of time, and they are not without danger of explosion or taking fire of the alcohol or of the cumol. I have tried them all and given them all up. The method described below has the advantage that the needed materials are easily obtained, and the only other requisites are a few bottles or jars and a very few minutes' time. It is therefore peculiarly adapted to men in the country or in small towns, where it is impossible to carry on the more troublesome methods alluded to. While the methods above mentioned are reliable, so that I should not hesitate to use catgut prepared by any of them, yet I have found this so much more simple that it is by preference that which I employ. It is, so far as I have had experience, superior to the formalin method recently advocated by Professor Senn.

The method I have called the "Jefferson method," because it was first introduced into use in that hospital by John

Johnson, an orderly in the clinic, but a man of unusual chemical knowledge and fertility of experiment, as is shown by his ethereal soap and other preparations. I have used this method in the Jefferson and the Orthopædic Hospitals, as well as in my private hospital, and most of my colleagues also have employed it, for three or four years. We have, therefore, given it a clinical test, which is sufficiently extensive and exact to be conclusive.

Three things are necessary to make the use of catgut desirable. First of all, that the catgut shall be absolutely sterile. I have had the catgut prepared by this method tested repeatedly and in no single instance have any growths occurred, even in stout catgut. The clinical test in hundreds of cases has been as satisfactory as the bacteriological.

Secondly, the gut must be strong. No. 1 catgut can be used when prepared by this method for the small vessels. It can be broken, of course, but only with considerably more force than would be necessary to ligate the small vessels. No. 2 will not break easily. No. 3 requires very considerable strength to break it, and above that size it is very difficult with the utmost strength to break the catgut. The thicker sizes are, therefore, suitable for ligation of stout pedicles. Any one who has had experience with the annoyance, especially of stout silk and the sinuses caused by it, will be very glad to know that the catgut is not only aseptic, but is strong and readily absorbed. I have myself recently had some breast cases in which I tied the vessels with fine silk, and yet small abscesses formed as long as three and four months after the operation-wound had healed, exciting the liveliest apprehension in the patient and the family lest it was a beginning recurrence of the disease. If it is desired to have the gut more slowly absorbed it can be chromicized to any desired degree.

Third, the catgut must be flexible enough to tie in a reliable knot. I have found this catgut answer that purpose as well.

The description of the method I take from the "Year-

Book of Medicine and Surgery" for 1896, p. 340, as follows:

"First, steep the gut, as received from the manufacturer, in the best ether; allow light gut to remain in it for not less than twenty-four hours; heavy gut for forty-eight hours. When it has been steeped a sufficient length of time in the ether transfer it directly into a mercuric chloride mixture, consisting (proportionally) of forty grains of mercuric chloride and 200 grains of tartaric acid, in twelve fluid ounces of 95 per cent. alcohol. Very fine gut should not remain in the mercuric mixture longer than from five to seven minutes, the next size ten to fifteen minutes, and the third and fourth sizes from twenty to twenty-five minutes respectively. Before transferring the gut from the ether into the mercuric chloride mixture, jars for keeping it ready for use should be at hand, thoroughly scalded, and then bathed in an aqueous solution of mercuric chloride (1-1000). When the jars are ready they should be nearly filled with alcohol (95 per cent. strength), containing palladium-bichloride in the proportion of one-sixteenth of a grain (two drops of a solution, which contains fifteen grains of the salt to the ounce) to the pint of alcohol (more of the true bichloride of palladium will not stay in solution in alcohol, and when a precipitate occurs through excess of the palladium the whole goes to the bottom and is not soluble in alcohol). As the gut is lifted from the bichloride mixture it should be dropped into the prepared alcohol, and is then ready for use, and will keep, as far as is yet known, for any length of time. When an operation is about to be performed, a piece of gauze, a clean handkerchief, or a napkin wet with a mercuric chloride solution should be wrapped round the jar after the mouth has been well wiped with a wet bichloride cloth. The quantity of gut judged necessary for the operation should then be lifted out by means of a sterilized instrument and dropped into a dish, previously sterilized for the purpose and having sufficient alcohol in it to keep the gut from drying. If any of the quantity laid out for use at an operation is left, it may be put

back again into the jar, but should first be immersed in the corrosive mixture and left for two or three minutes in it. If there is suspicion of the jar having been opened without due precaution having been taken, the safest way is to pour off the alcohol and fill the jar with the corrosive mixture, which, in two or three minutes, may be poured back into its own jar, and fresh alcohol put upon the gut. By such means there is absolute safety against infection from the gut."

AN IMPROVED TECHNIQUE FOR THE AVOIDANCE OF FISTULA AFTER CHOLECYSTOSTOMY.

By WILLIAM DAVID JONES, M.D.,

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IN doing operations upon the intestines we attempt to bring the peritoneal surfaces into apposition; if we fail in this the result is obvious. It has occurred to me that the principle involved in successful intestinal surgery could be advantageously applied to gall-bladder surgery.

To test the feasibility of this principle, and at the same time establish a procedure insuring early closure of the fistula, I carried out a number of experiments upon the dog, as follows:

After opening the abdomen by any of the usual incisions to secure access to the gall-bladder, this viscus is brought up into the upper angle of the wound, and after being opened and any required manipulations done, the bladder is brought up so the opening is on a level with the outer surface of the abdominal muscles and sutured to the parietal peritoneum by a continuous gut suture after closing the latter up to the gall-bladder. A catgut suture is now introduced through muscle and fascia, hugging the upper surface of the parietal peritoneum and perforating the gall-bladder just above the suture-line of bladder and peritoneum; the needle is brought up out of the gall-bladder and made to pick up the edge of the incision into the same, and perforate it from within outward; then is reintroduced four or five millimetres to either side of the first puncture into the gall-bladder wall, emerging just

¹ Read before the Medical Society of York County, Nebraska, November 2, 1897.

above the parietal peritoneum, having perforated muscle and fascia a short distance from where it first entered. When this stitch is tied, the respective portion of the gall-bladder is perfectly inverted. The opposite side is sutured in the same manner.

The technique of applying the superior and inferior inversion-stitch differs slightly from that of applying the lateral,

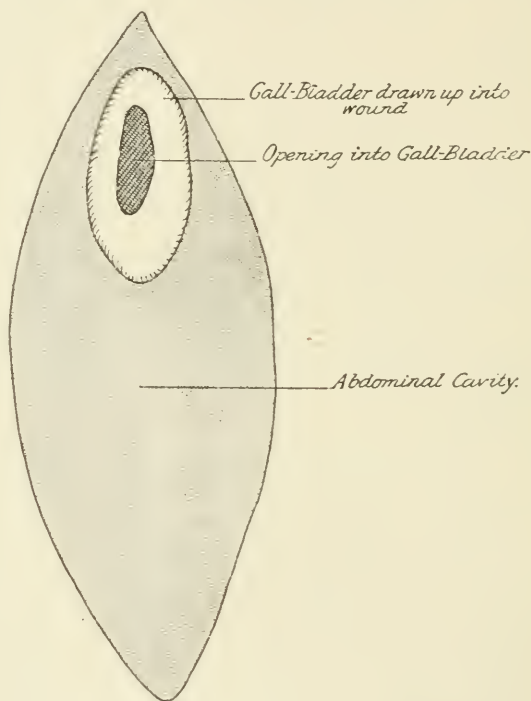


FIG. 1.

just described. Pass needle armed with suture through muscle and fascia, puncture wall of gall-bladder just above the suture-line of same to peritoneum, pierce edge of bladder-opening of respective angle of wound, and then perforate the opposite wall of gall-bladder, muscle, and fascia. Now introduce drainage-tube and tie the superior and inferior inversion-sutures, and there will be perfect inversion of edges

of bladder wound into gall-bladder, and when the tube is removed the peritoneal surfaces of same will lie in perfect apposition.

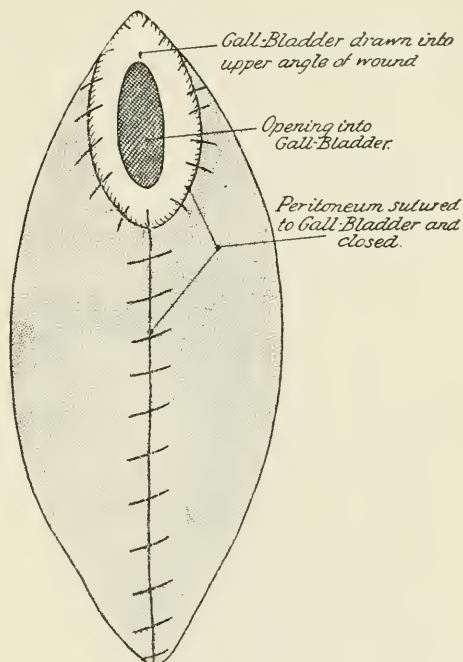


FIG. 2.

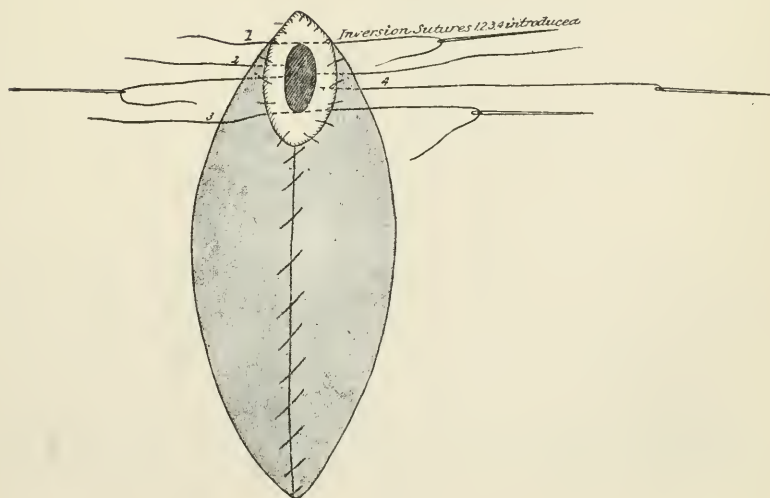


FIG. 3.

The remaining (greater) portion of muscular wall is brought together by interrupted or continuous pyoktanin catgut suture. After suturing skin with continuous suture, there is not a vestige of the gall-bladder to be seen upon the closest inspection.

This operation is superior to the old one for the following reasons:

(1) Closure of fistula is almost immediate upon removal of tube, and absolutely certain.

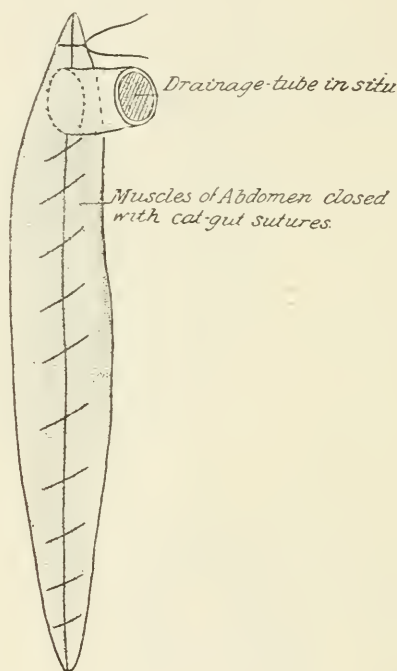


FIG. 4.

(2) There is not the danger of leakage into peritoneal cavity.

(3) Chance of hernia where the gall-bladder is sutured to abdominal wall is reduced to a minimum.

EXPERIMENT I.—Bitch; weight, twenty pounds. Abdomen opened over gall-bladder by oblique incision three inches long.

parallel with lower edge of costal cartilages. Gall-bladder brought up, incised, and drained. Gall-bladder sutured to peritoneum and edges inverted as described above; drainage-tube introduced and abdominal wound closed. Silk suture was used and technique unsatisfactory. Bile discharged through tube and

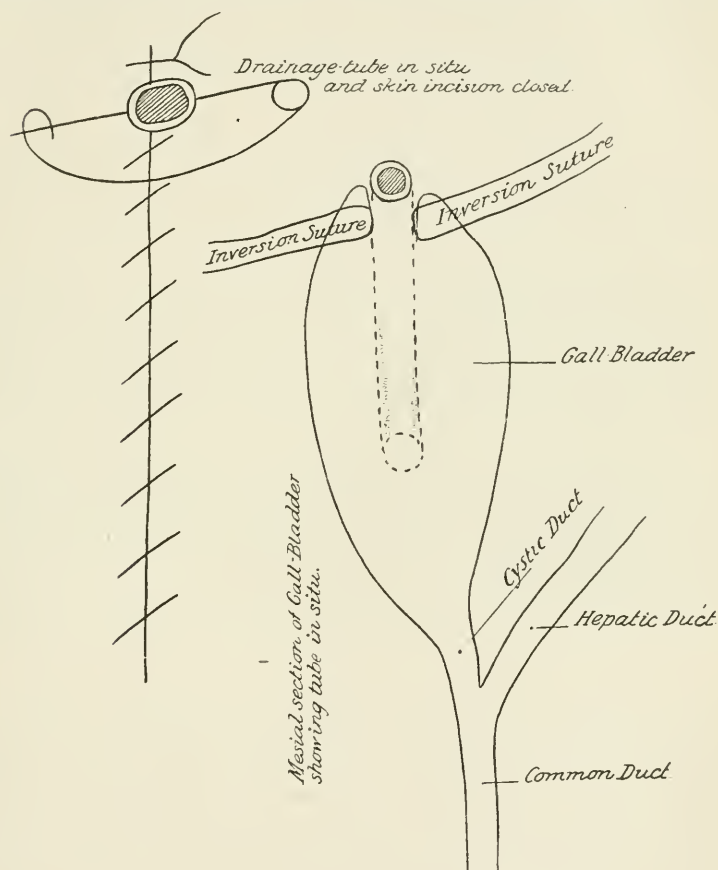


FIG. 5.

saturated dressings. Tube removed in twenty-four hours. Fistula closed on ninth day.

EXPERIMENT II.—Bitch; weight, fifteen pounds. Anæsthetized and abdomen opened over gall-bladder by oblique incision parallel to costal cartilages. Gall-bladder aspirated, opened, stitched to parietal peritoneum, and edges inverted as

described. Drainage-tube introduced, giving exit to free flow of bile. Abdominal wound closed and tube immediately removed. No discharge of bile.

EXPERIMENT III.—Dog; weight, fifty pounds. Oblique incision. Gall-bladder opened and sutured to parietal peritoneum by pyoktanin catgut sutures, edges inverted, drainage-tube introduced, and abdominal wound closed. Drainage-tube removed at the end of thirty-six hours. Fistula discharged no bile after third day following its removal.

EXPERIMENT IV.—Dog; weight, 150 pounds. Abdomen opened by incision through outer edge of right rectus muscle. Gall-bladder brought up into wound, opened, sutured as above with pyoktanin catgut, and abdomen closed. Enormous quantities of bile discharged through tube. Dressings disturbed the first night after operation and wound infected. No untoward effects upon the animal, as he ate well after the first twelve hours following the operation. Tube removed after thirty-six hours, and twenty-four hours following no bile was discharged through fistula.

EXPERIMENT V.—Dog; weight, eighty pounds. Straight incision through outer edge of right rectus. Gall-bladder treated as above and abdomen closed. Tube removed from gall-bladder after forty-eight hours. At end of thirty-six hours no bile was discharged from fistula.

REPORT OF A CASE OF TRAUMATIC PERIEN- CEPHALITIS WITH CEREBRAL ABSCESS.

By MELVIN M. FRANKLIN, M.D.,

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OF ST. JOSEPH'S HOSPITAL.

SPITZKA, after making the statement that "there is little difficulty in recognizing the existence of cerebral abscess in which well-marked focal and constitutional symptoms coincide, or where a distinct abscess-producing cause, such as ear trouble, a head injury, or a putrid bronchiectasis co-exists," adds, "but there are a number of cases varying from the latent form to forms with obscure general symptoms, where recognition is impossible or at best a matter of conjecture." This statement expresses fully the difficulties involved in the diagnosis of surgical cerebral affections in general, and the following case in particular:

S. L. L., aged forty years, a native of Williamsport, Pa., a machinist, married, has one child thirteen years old, was admitted to St. Joseph's Hospital August 24, 1896. He denied alcoholic and specific history, but admitted the moderate use of tobacco. He had had the usual diseases of childhood. In September, 1892, while at work, he was struck in the left frontal region (marked scar still visible) with a sledge-hammer, and was rendered for a time unconscious, after which he suffered from pain in the head for three or four days, but it gradually wore away. In December, 1893, he had an attack of influenza, which confined him to bed for about a week. During his convalescence he developed an internal squint which was corrected by tenotomy by an oculist. He also suffered from severe pains at or about the site of the old injury. The following February (1894) he was at-

tacked with what he called brain trouble, which caused him to act in a very restless manner. He walked the floor, at times being unable to sleep, and at other times in a deep stupor; at one time the stupor being so pronounced that he could not be aroused by the attending physician. In May, 1896, after a period of over a year, in which there had been much improvement, he was again troubled with insomnia, and complained of severe pain in the left frontal region in immediate proximity to the scar. He also suffered from numbness more or less distributed over the whole right side of the body, but located principally in the right hand, arm, shoulder, and face. This attack lasted for three or four weeks, and was followed by a brief period of improvement. On July 8, without warning, other than a slight pain in the head early in the morning, which only lasted about half an hour, he was seized with a partial paralysis of the arm, shoulder, hand, and foot on the right side. This paralysis soon became complete on the right side, especially of the upper extremity, and during this time he suffered from clonic spasms, beginning in the hand and going to the shoulder. He was unable to distinguish objects, and had more or less difficulty in walking.

Status Præsens.—He complains of a jerking of the right hand and shoulder and of a tightness of the right side of his face; also from severe pain distributed over the left frontal region. Giddiness often accompanies the headache. In the early stages of his illness constipation was troublesome, now his bowels act regularly. Sense of pain tested by pricking with a pin is not so acute on the right side as on the left. Reflexes normal. Hearing, smell, and taste not affected. Muscular tone: The grasp of the right hand is very much more forcible than the left. He is naturally right-handed. He also suffers from sleeplessness. Eyes: Pupils equal. Reaction to light rather sluggish. The eye-grounds under the influence of homatropine showed haziness of both visual fields. Urine: Pale-yellow in color; reaction alkaline; specific gravity, 1018, solids (approximate) eighteen grains per ounce; no albumen; no sugar. Microscopical examination: negative.

Upon admission he was placed on the mixed treatment, the dosage being gradually increased; but because of the patient becoming rapidly mercurialized, it was discontinued and a tonic treatment substituted. During the six weeks previous to the

operation, he complained of severe frontal headache, principally on the left side, and a raising or jerking of the right shoulder and arm. The temperature fluctuated between $99\frac{2}{5}^{\circ}$ and $105\frac{1}{5}^{\circ}$ F.

TABLE OF TEMPERATURE.

Date.	Temperature.	Pulse.	Date.	Temperature.	Pulse.
August 26	99.2	96	September 17	99.3	100
" 27	101	99	" 18	99	84
" 28	100	99	" 19	98.3	70
" 29	98.4	96	" 20	98.4	100
" 30	98.4	96	" 21	98	76
" 31	99	96	" 22	98.3	84
September 1	98	96	" 23	98.3	76
" 2	99	94	" 24	99.2	80
" 3	98.4	93	" 25	98.4	70
" 4	98	90	" 26	99	84
" 5	98.3	94	" 27	99	90
" 6	99.3	90	" 28	100.1	90
" 7	98.3	90	" 29	99.3	74
" 8	98.3	90	" 30	101	120
" 9	99.1	104	October 1, A.M. . .	101.2	96
" 10	99.3	100	" P.M. . .	104.1	100
" 11	100.2	100	" 2, A.M. . .	103	96
" 12	100.1	98	" P.M. . .	103.2	100
" 13	100	96	" 3, A.M. . .	100.4	96
" 14	99.1	86	" P.M. . .	100	90
" 15	99	74	" 4, A.M. . .	102	98
" 16	98.3	100	" P.M. . .	105.1	140

(Death.)

His memory gradually became more and more blunted. On September 30, at 4 P.M., he became suddenly unconscious and developed a hemiplegia of the right side of body, with complete loss of sensation of the upper extremity. It was then decided to operate, because of the earnest request of the patient's family, although no hope was held out through such procedure.

Operation.—On the shaven scalp the Rolandic fissure was mapped out with indelible pencil. A semicircular incision, with this line as its centre, was made through the scalp to the bone, and the flap with the pericranium turned downward. After the hæmorrhage was controlled, a large trephine was placed over the face- and arm-centre, and a button of bone removed. Upon exposing the dura, the brain, which was of a dark-gray color, bulged considerably; but no pulsations were noticed. The dura was adherent around the entire margin. It was freed, and the

finger was then swept over the temporal and frontal lobes, but no fluctuating mass or tumor could be distinguished. I then opened and turned down a flap of the dura mater, but as nothing further could be ascertained, an aspirating needle was run into the brain in several different directions with no result. After the operative manipulations pulsation returned; the dura was sutured in place, the button of bone being left out, and the scalp brought in apposition. During the operation the patient did not suffer from shock, and he was returned to his bed in fair condition.



Showing location of cerebral abscess.

Immediately following the operation his temperature was 104° F.; pulse, 130; respirations, 34 per minute. He could not move his right upper extremity or open his right eye, but moved freely the other parts of the body, at times he had convulsive seizures of hand, arm, etc., and at others lapsed into absolute quietude. The temperature at 8 A.M., the next morning, was 102° , but pulse-rate and respirations still high. That afternoon he was able to talk, but it was almost inaudible. The following day his condition was worse. Temperature at 12 M. 104° , pulse 138 per minute, and it was with difficulty that he could be restrained to his bed. The patient's condition remained the same until the third day after the operation, when death ensued. The

temperature taken just previous to death registered 105.1° and the pulse 140.

Autopsy, six hours after death, by Dr. Herbert Fischer, resident surgeon to St. Joseph's Hospital. The wound in the scalp was healed without the formation of any pus. The internal surface of the dura was adherent on the left side to the calvarium in the frontal and temporal region, in other parts was healthy in appearance. On the left side anterior all the membranes of the brain were matted together, this not being the case over the right side. The veins were markedly engorged on the left side. No clots were found in the venous sinuses. The arteries at the base of the brain were normal, and there existed no evidences of disease of their walls. The cortex of the right hemisphere was normal, but in the left there existed, at about the junction of the upper and middle Rolandic region, and about three-fourths of an inch beneath the surface, a fairly well-defined area, the size of an English walnut, containing a jelly-like substance looking like inspissated pus, the microscopical examination of which proved to contain pus-cells, but no bacteria. The cerebellum and ventricles were normal. No other pathological changes were observed.

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THREE CASES OF SWALLOWED FOREIGN BODIES LOCATED BY THE RÖNTGEN RAYS.

By JOHN B. DEAVER, M.D.,

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SURGEON-IN-CHIEF OF THE GERMAN HOSPITAL.

THE following cases are of interest as illustrations of the practical application of X-ray photography for the location of swallowed foreign bodies, and the comparative ease with which two of them were removed. The stomach case is of particular interest on account of the nature of the foreign body, the age of the patient, the character of the operation, and the prompt recovery.

CASE I.—M. M., aged two years. Twenty days prior to operation he had swallowed a one-cent piece. He had been twice anæsthetized, but without accomplishing either the removal of, or pushing into the stomach of, the penny. A skiagraph, taken after admission to the German Hospital, showed the penny situated at the narrowest portion of the œsophagus, opposite the level of the fifth and sixth cervical vertebræ. The penny was then extracted readily by means of a coin-extractor. The patient was sent home the same day.

CASE II.—C. B., aged three years, had swallowed a one-cent piece two weeks prior to admission to the German Hospital. The child was unable thereafter to swallow any solid food. A skiagraph revealed the penny occupying the same location as in Case I.

CASE III.—Bertha C., aged fourteen months. Five hours before admission to Children's Hospital, Mary J. Drexel Home, she had swallowed an open safety-pin. A skiagraph (see plate) showed the pin to be in the stomach. Gastrotomy was immediately performed for its removal. The patient was discharged in ten days. Recovery without an unfavorable symptom. The child was allowed the breast the day following operation.

CARCINOMA OF THE BREAST WITH A ROUND-CELLLED SARCOMA IN THE SUBMAXILLARY REGION IN THE SAME INDIVIDUAL.¹

By WILLIAM B. COLEY, M.D.,

OF NEW YORK.

MRS. M., aged fifty-three years, without hereditary history of cancer, was operated upon in the spring of 1894 for carcinoma of the left breast and involvement of the axillary glands. The patient remained well until the fall of 1895, when enlargement was noticed in the left submaxillary gland. This continued to increase until January 1, 1896, when it had become a tumor three inches in diameter, situated just beneath the angle of the jaw on the left side; it was slightly movable. The patient was treated by her physician, Dr. R. Oliver Phillips, of Yonkers, N. Y., for four weeks with the mixed toxines of erysipelas and bacillus prodigiosus, with the result that the tumor decreased two-thirds in size, and became very movable.

On March 14, 1896, with the assistance of Drs. E. M. Foote and R. O. Phillips, I operated, under ether anæsthesia. Two spheroidal masses, one three-quarters of an inch, the other one inch in diameter, were removed from the deep submaxillary region; both were entirely encapsulated, and on section showed, macroscopically, the typical characteristics of malignant disease. Careful microscopical examination by Drs. E. K. Dunham and B. H. Buxton, pathologists in the New York Cancer Hospital, failed to find anything more than glandular hyperplasia. Careful examination at the time of the operation of the region of the breast, axilla, and supraclavicular triangle, showed no evidence of glandular enlargement. The patient's general health was good. In June, 1896, a recurrence took place in the region of the breast and axilla, involving the skin, subcutaneous tissue, and pectoral muscle. In the latter part of July, 1896, I operated,

¹ Read before the New York Surgical Society, October 13, 1897.

removing the entire diseased area, together with both pectoral muscles. The wound healed without suppuration; patient making a prompt recovery. Microscopical examination showed the tumor to be a typical scirrhus carcinoma. Shortly after the operation upon the breast, a recurrence took place at exactly the site of the first operation, in the submaxillary region, and the tumor grew with great rapidity. I performed another operation in September, 1896, removing an encapsulated tumor, the size of a small egg, with precisely the same characteristics as the first. In view of the macroscopical appearance and the prompt recurrence, I felt convinced that the tumors in this region were more than glandular hyperplasia, and asked for a very careful



Sarcoma of neck, with carcinoma of breast. (Coley.)

microscopical report. A large number of sections were made before evidences of sarcoma were discovered. These examinations—by Drs. Dunham and Buxton—showed the growth to be round-celled sarcoma. About a month afterwards a second recurrence took place in the submaxillary region; the tumor grew with greater rapidity than before. The deeper tissues were at this time involved, and further operation was considered useless. At no time were the supraclavicular glands enlarged, and the tumor in the neck had the soft, cystic appearance of a rapidly growing round-celled sarcoma. (See figure.)

The subsequent history was briefly as follows: The tumor

continued to grow, filling up the entire neck. It became markedly protuberant, and was so soft as to give the appearance of fluctuation, although aspiration failed to discover fluid. At no time was there ulceration or sloughing. The growth finally filled the mouth and the neck, making it extremely difficult to speak and still more difficult to swallow. The patient finally died of exhaustion on March 18, 1897.

A slight local recurrence of the carcinoma was noticed in the skin; this increased but little, however, and at the time of death was no more than a small infiltration of the skin.

Repeated examinations of the tumors removed from the neck showed no trace whatever of epithelial proliferation; hence this case seems to be one that can be explained only on the theory of two entirely different forms of malignant disease occurring in the same individual.

As examples of the coexistence of mammary cancer with sarcoma elsewhere, Roger Williams was able to collect eleven cases; in eight of these the sarcoma was found in the other breast, while in three the sarcoma—same as in my case—appeared in other regions than the breast.

The cases are as follows:

CASE I.—(De Morgan's case, *Transactions of the Pathological Society*, London, Vol. xix, p. 394.) Adenosarcoma of the left breast with scirrhus cancer of the right breast.

CASE II.—(Billroth's case, *Chirurgischen Klinik*, Wien, 1868, S. 68.) Cystic sarcoma of the left breast, locally recurrent after amputation, without involvement of the axillary glands, with cancer of the right breast, with involvement of the axillary glands.

CASE III.—(*Lancet*, Vol. i, 1876, p. 315.) A case shown before the Clinical Society of Kesteven. Six years after extirpation of a recurrent mammary cancer, the patient developed cancer of rectum and sarcoma of femur.

(This case must be regarded as doubtful, as there is no note that a microscopical examination was made, and there is reason to suppose that it was one of the rare cases of cancer of the femur following mammary cancer. I have seen two such cases.)

CASE IV.—(Bryant's case, "Diseases of the Breast," p. 335, London.) Mixed-celled sarcoma of the right breast, of eight months' growth, having attained the size of a cocoanut, with

atrophic scirrhus of the left breast, of sixteen years' duration. The sarcoma was removed, but speedily recurred, and within the following four and a half years sixteen operations were performed. There was no increase in the scirrhus.

CASE V.—(Bryant's case, "Diseases of the Breast," p. 335, London.) A female, aged fifty years, who had the left breast amputated for cancer of two years' duration, four years later developed a melanotic sarcoma in a mole in the skin of the left axilla; this was excised six months later; there was no recurrence. Eight years later there was a local recurrence of the original cancer which caused death.

CASE VI.—(*Ibid.*) Ulcerating melanotic sarcoma, the size of an orange, in the right axilla, originating in a cutaneous mole. This was excised and the patient was well for four years, when the breast on the same side developed a cancer. There was no recurrence in the scar of the old operation. The breast was amputated, and the patient was well eight years later.

CASE VII.—(*Bristol Med. Chir.*, December, 1889.) A case of Dobson's developed a round-celled sarcoma of the tonsil two years after amputation of the breast for cancer.

CASE VIII.—Guende, in the *Marseille Médical*, No. 7, 1890, p. 422, reports a case of sarcoma of the choroid in a woman with mammary cancer.

SARCOMATA OCCURRING ELSEWHERE THAN IN THE BREAST.

CASE I.—(Hutchinson, *Archives of Surgery*, Vol. iii, pp. 9, 48.) A case who, after enucleation of the eye for melanotic sarcoma, died, ten years later, of cancer of the uterus. No recurrence of sarcoma.

CASE II.—Cutler (*Boston Medical and Surgical Journal*, October 6, 1892) reports a case of sarcoma of the ovary with cancer of thoracic and abdominal organs.

A COMBINED ASPIRATING NEEDLE AND DIRECTOR FOR OPENING DEEP-SEATED ABSCESSSES.

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ABOUT twenty-five years or more ago I had several cases of pelvic abscesses, of hæmatoceles, and of ovarian cysts, which I treated by drainage. I had a long wingless director made, and after I had entered the cavity of the abscess with the trocar and canula I withdrew the former and passed through the canula my wingless director, then I withdrew the canula over the director and passed a knife, or a dilator, along the director into the cavity of the abscess, opened it freely, explored, if I cared to, with my finger, and put in a drainage-tube.

At that period our diagnoses were not as quickly made as now, nor were we so sure we were right. I opened a dermoid cyst through the rectum because I only knew that it was a collection of fluid, and, having entered and dilated the opening, I tied in a large œsophageal tube, and, after many weeks of syringing and many periods of high temperature, finally cured it. Lately I have had several cases of appendicitis, in which I have had to open and drain abscesses through the rectum.

When one punctures the thorax with an aspirating needle and gets pus, it is of very little consequence whether one uses a director on which to guide the knife or not; at the same time a sharp-pointed director, as suggested by Cabot, is at times very convenient, but it is not necessary;

one can use the knife boldly without any guide and thrust it straight into the chest. But when it is necessary to open an intraperitoneal abscess through the rectum, one does not like to take out the aspirating needle until one is sure of finding the cavity of the abscess again; furthermore, it is very difficult, in passing a knife by the side of a small aspirating needle, to keep it by the side of the needle which has been pushed up into the abscess through the movable bowel. Consequently I have had this useful instrument made. It is simply an aspirating needle with a groove, like that in a director, on its outer side.

I use it in this way: First I feel the elastic swelling of the abscess through the rectal or vaginal walls; then I push my finger forcibly against the nearest fluctuating place, avoiding arteries; next I thrust in the needle by the side of and in front of the point of my finger, and when I think the



point is in the abscess-cavity I turn on the aspiration; if pus is sucked out I pass a narrow-bladed knife, not much wider than a tenotomy-knife, along the groove in the outer wall of the aspirating needle. This manœuvre opens the abscess freely, and later I open it still more with a pair of dressing forceps or a dilator. The finger may then be used as an explorer, and later, after the abscess-cavity has been thoroughly douched out, I put in a T-shaped drainage-tube, the T about two inches wide and the tube long enough to project several inches outside the anus. That part of the tube outside the anus must be fastened with a safety-pin or the rectal muscles will pull it up into the rectum. Later a Holt's self-retaining catheter is substituted for the drainage-tube.

The instrument has been very neatly made by Codman & Shurtleff, and can be furnished in different sizes and of different diameters.

A PRELIMINARY REPORT UPON THE EXAMINATION OF THE BLADDER AND THE CATHETERIZATION OF URETERS IN MEN.

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WHEN I first succeeded in my vesical and ureteral examinations in women, in the spring of 1893, I expressed a conviction which I have often restated since then, both to my staff and to visiting physicians at the Johns Hopkins Hospital, that the bladder in the male could also be investigated in a similar manner, and, in all probability, the ureters could be catheterized. So positive was my conviction that I had a long, straight, male cystoscope made by Messrs. F. Arnold & Sons, of this city, November 18, 1893.

Much as I have desired to do so it has been impossible for me to test this instrument until quite recently, owing to the excess of my regular professional obligations always crowding me for time, as well as to the fact that such men as did come under my care were private patients, and although suffering with renal diseases in some instances, I was not at liberty to pursue any line of investigation which might justly be called experimental. I also placed an instrument more than two years ago in the hands of my colleague, Dr. Joseph Bloodgood, of the Johns Hopkins Hospital, who used it to examine the bladder in a case through a perineal section, upon which subject I trust he will have something to say at a future date, but the instrument was not further tested through the intact urethra owing to the fact that the Casper electric cystoscope was already established in the male genito-urinary department, and its use well understood.

I succeeded in securing a patient and testing the method of direct examination in the male bladder, through a simple straight speculum and under atmospheric distention induced by posture, for the first time on November 20 of this year, and I owe this opportunity to the courtesy of the surgical staff of the Johns Hopkins Hospital, and particularly to Drs. Harvey W. Cushing and Hugh H. Young.

The patient, a man about forty-eight years old, had a persistent hæmaturia of undetermined origin. After due antiseptic precautions and washing out the bladder, it was filled with a saline solution and first examined with the Casper cystoscope. For the most part the bladder wall was found normal, but at the base a dark, tufted, villous area was found from which a cloud of blood kept rising and mingling with the clear medium. The conclusion was reached that this was probably a vesical papilloma.

The bladder was then emptied with a catheter and the patient placed in the knee-breast position, with the chest close down to the table, the elbows spread apart, and the thighs slightly drawn up under the abdomen.

The straight cystoscope was then introduced, eight millimetres in diameter, and with a tube eighteen centimetres long, with a funnel-shaped opening and a diminutive handle like those attached to my first cystoscopes used in women. This cystoscope, made for me in November, 1893, was inserted into the bladder by Dr. Young without difficulty, while the patient was still in the dorsal position; when he assumed the knee-breast position the obturator was drawn out and air at once entered the bladder. I attempted to let air into the rectum in order to drop the base of the bladder down more into the plane of vision; but little went in.

The examination of the bladder was now conducted by looking into it through an ordinary head mirror, reflecting an electric light which was held close to the sacrum. The base of the bladder came perfectly into view, and the posterior walls were readily seen. The sound mucosa of the posterior wall showed the characteristic pallor, with small vessels branching here and there over its surface; we were able to see at once that the base was simply coated with blood which had accumulated there in the most de-

pendent position, and that there was no papilloma or other growth present. The trigonum and the interureteric ligament were injected and plainly defined.

I was enabled to see and to demonstrate the orifice of the left ureter and to introduce into it one of the metal catheters which I use in women. While the speculum was held up against the ureter, drops of urine trickled out of it down the tube of the speculum and collected on the edge of the funnel. The urine was claret colored, demonstrating at once the renal source of the hæmaturia. I could not introduce one of my long flexible renal catheters into the ureteral orifice, as I was unable to control the end of the catheter through the long narrow speculum.

The examination was rendered difficult throughout by the insufficient control of the instrument afforded by the small handle; I also found that the tube of the speculum was longer and a little smaller than necessary.

It is a satisfaction to me to be able to show in this report that my expectations have been realized, and I shall hope at a later date to present a fuller account of the methods of examination, with a description of a variety of better instruments for the purpose of examining and exploring the bladder in men. If we can succeed in doing away with the electric cystoscope by substituting a simple, direct method of examination for an expensive, complicated, and even dangerous instrument, the gain will be great.

My direct method of examining also admits of direct methods of treatment. I could, for example, have cut or burned through the pedicle of a papilloma at the base of the bladder with almost the same facility with which I was able to inspect it.

FOUR CASES OF SECONDARY SYPHILIS COMPLICATED WITH CHRONIC APPENDICITIS, IN WHICH A CONTINUOUS COURSE OF TONIC DOSES OF MERCURY RESULTED IN MARKED SUBSIDENCE OF THE APPENDICULAR SYMPTOMS.¹

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THE cases here set forth are recounted that the attention of the profession may be directed to what seems to be somewhat remarkable results following the use of what is known as "tonic doses" of mercury in cases of syphilis, complicated with chronic appendicitis, where surgical interference had been clearly indicated, but declined by the patient.

It is hoped that this paper will attract attention, so that those who have had experience similar to my own may bring their cases to the notice of the profession, and sufficient data collected whereby conclusions may be reached as to the expediency of employing mercury under the circumstances detailed.

Every surgeon from time to time meets with cases of chronic appendicitis where an operation is necessary, but will not be submitted to by the sufferer; it is believed that to this class the treatment here suggested may be of service.

My attention was first attracted to the beneficial effects of prolonged doses of mercury in chronic appendicitis by the result of the treatment of a patient who came under my care

¹ Read before the Philadelphia Academy of Surgery, November 1, 1897.

four years ago, suffering from secondary syphilis, accompanied by chronic appendicitis; since then I have had three similar cases, where the individuals were affected with secondary syphilis, and who had had frequent attacks of appendicitis before the syphilitic treatment was begun.

The persons had from time to time consulted many surgeons, each of whom had strongly advised the removal of the appendix.

In each case I advised that an operation should be performed when the disease under which they labored had been brought under control. One of the patients had been under my care for four years, two for two and a half years, and one for the space of a year and a half. Two have had one attack each of acute inflammation of the appendix during the first six months of their mercurial treatment; the remaining two have had no trouble since they have been under specific treatment.

As a result, the patients have been improved in health and strength and have gained in weight; there is a marked improvement in their digestion, while the constipation, which existed in a marked degree, has given way to a regularity almost normal.

The histories of these cases are briefly as follows:

CASE I.—H. H., merchant, forty-one years old, consulted me four years ago, suffering under the ordinary symptoms of mild secondary syphilis. He averred that he had had nine attacks of appendicitis, and had only recently recovered from the last seizure. He was pale and anæmic, and stated that he was below his natural weight. His appetite was good, but he suffered from obstinate constipation, for the relief of which he was in the habit of taking a grain of podophyllin daily. He had consulted four of the most distinguished surgeons of the city; all had strongly urged the removal of the appendix.

On examination an indurated mass could be distinctly felt in the right iliac fossa; it was somewhat tender to the touch. The danger of the non-removal of the appendix was carefully pointed out, and an operation was recommended, to be per-

formed as soon as the syphilitic affection was under control and the general health somewhat improved. His "tonic dose" of the protiodide of mercury was found to be 10/5, which was administered in three doses during the twenty-four hours. His diet was restricted to plain nourishing food; violent exercise was interdicted. The patient's general health rapidly improved; the syphilitic symptoms disappeared; the red blood-corpuscles increased in number, and the operations from the bowels became normal.

After the individual had been under treatment for the space of two months an acute attack of appendicitis was suddenly developed, and for two days I hesitated whether or not an operation should be performed. He, however, gradually improved, when the mercurial treatment was resumed, and continued without intermission until January, 1896, a period of three years.

At this time he is in better health than he has been for years. He has had no return of appendicitis since the last attack that he sustained shortly after he placed himself under my care, nearly four years ago. The doughy mass which at that time could be distinctly felt in the iliac fossa has entirely disappeared.

CASE II.—G. W., aged thirty-one years, broker, came under my care three and a half years ago, suffering from the symptoms of secondary syphilis. He had had three attacks of acute appendicitis. He suffered from intestinal dyspepsia accompanied by costiveness. His general health was below par. He was placed on a "tonic dose" of protiodide of mercury, which was followed by rapid amelioration of his physical condition. He had been under treatment about a year when a slight attack of acute inflammation of the appendix was developed, which was promptly arrested. When he was fairly convalescent an operation was urged, but declined, and the mercurial treatment was resumed. From that time the patient has had no further trouble from his appendix. His general health is excellent.

CASE III.—L. S., lawyer, twenty-eight years old, began to be treated by me three years ago for a recent attack of syphilis. He stated that he had had five attacks of appendicitis. He had consulted several surgeons, who had all recommended the removal of the appendix. His general health was fairly good. The right iliac fossa was tender to the touch, and a doughy mass could be distinctly outlined on palpation. He was placed on

proper tonic doses of protiodide of mercury, when he gradually improved in health. He has had no further trouble with his appendix.

CASE IV.—O. A., aged thirty-three years, businessman, came under my observation for the first time a year and a half ago, suffering from secondary syphilis. He stated that he had had two attacks of acute appendicitis. He was pale, weak, and anæmic; complained of indigestion and constipation. An examination of the iliac fossa revealed marked signs of chronic appendicitis. He was placed on tonic doses of protiodide of mercury, which have been continued to the present time.

During the period that he has been under my care he has had two attacks of appendicitis; the last, which occurred during the month of June, was probably brought on by bicycle riding, indulged in contrary to my explicit directions. Since last June he has had no further appendicular trouble, although he suffers from intestinal dyspepsia, with a tendency to constipation. His general health is below par.

The histories of these four cases seem to be of more than usual interest. Catarrhal forms of appendicitis, where the individual may have had one or more acute attacks of the malady, are the experience of all; but the chronic form of appendicitis following acute attacks to succumb to the employment of tonic doses of mercury appears remarkable and well worthy of further consideration. All these cases were so well marked that any surgeon would have considered himself justified in operating.

These four cases make too limited a number upon which to base practical deductions whereby to arrive at definite conclusions as to the remedy employed; the abatement of the inflammatory appendicular symptoms might possibly have been coincidental, or resulted from restrictions in diet, improvement in hygiene, or the effect of the mercury upon the morbid condition. It is to be hoped, however, that by directing the attention of the profession to these cases that the experience of others may be elicited, and a thorough discussion of the subject ensue; that a definite conclusion may be reached, and the value of the remedy, which apparently proved so valuable in my hands, fairly tested.

REMARKS UPON SOME POINTS IN THE TECHNIQUE OF THE OPERATION FOR APPENDICITIS.¹

By JOHN B. DEAVER, M.D.,

OF PHILADELPHIA,

SURGEON-IN-CHIEF TO THE GERMAN HOSPITAL.

THE points in the technique of the operation for appendicitis which I desire to discuss in the present communication are first, anæsthesia; second, the incision; third, the removal of the appendix; fourth, the treatment of the stump; fifth, drainage; and sixth, the suture of the wound.

Anæsthesia.—The necessity for complete anæsthesia will be appreciated by every operator in appendical work. Complete relaxation in all forms of abdominal work facilitates and shortens the time of operation. The necessity, in many cases, for protecting the general peritoneal cavity by gauze packing makes perfect anæsthesia particularly essential in appendical work, otherwise coils of intestine or portions of omentum will be forced between or around the pieces of gauze and cause the general peritoneum to be at once infected, or so exposed as to make its escape from infection miraculous.

The Incision.—The choice of incision, whether carried parallel with the semilunar line or obliquely between the anterior superior spine of the ileum and the semilunar line, depends upon the character of the case operated upon and the individual preference of the surgeon. Personally I perform both operations. The incision by the side of the semilunar line is small, and made to divide the tissues immediately to either side of the same,—namely, on the outer side, the skin, superficial fascia, aponeurosis of the external oblique, fibres

¹ Read before the Philadelphia Academy of Surgery, November 1, 1897.

of the internal oblique and transversalis muscles, transversalis fascia, properitoneal fat, and peritoneum; and on the inner side, superficial fascia, aponeurosis of the external oblique, anterior sheath of the rectus, part of the posterior sheath of the same muscle and its laminated extension downward, transversalis fascia, properitoneal fat, and peritoneum. This incision offers as good a chance for union against subsequent hernia as the one which splits the muscles. In suturing this wound the cut tissues are brought in apposition and properly secured by either the ordinary interrupted or buried suture. I know by experience that the resulting union is as good as can possibly be brought about by any of the various methods for the closure of abdominal wounds. The incision should be as small as possible. In chronic cases with few adhesions I am able, in the majority of instances, to take the appendix out through an incision that will admit the index-finger. It is possible to remove an inflamed, non-adherent appendix through an incision which can be closed with one suture. To attempt to work through too small an incision in acute or chronic cases where there is pus, even though this is undiscovered until the introduction of the finger into the belly cavity, is a mistake. The recognition, before operation, of a retrocaecal or pelvic collection of pus will of necessity call for a longer incision, which, if made primarily, will be of great advantage: it will materially shorten the time consumed in operating; it will permit of a freer disposition of gauze for walling-off purposes; it will allow a thorough survey of the affected area; it will facilitate manipulation, and, when the bowel is tied down by adhesions, afford the surgeon ample room to meet all emergencies. Those of us who have seen much of this sort of work have met with a percentage of bad cases, and know well that the salvation of the patient depends upon the non-infection of the peritoneum together with the removal of the appendix, both of which can only be accomplished with safety by the proper disposition of gauze. The incision must be large enough to permit of the necessary manipulation, even where the appendix is only slightly adherent.

The ultimate results in my cases in which I have not had to contend with pus are good; very few of them wear abdominal supporters. In fact, it is now rare for me to advise an abdominal supporter to be worn after operation in chronic cases. When a bandage is worn, it should be free of stays, pads, etc. The pad which is frequently attached to the abdominal supporter is often more harmful than otherwise, to say nothing of the discomfort it occasions.

When I use the buried suture it is always silver. From my work not only upon the belly walls but also in connection with the radical cure of hernia, I am convinced that silver is the ideal material for the buried suture.

Removal of the Appendix.—Strange to say, those who advocate leaving the appendix belong to the class of surgeons whose experience is limited in this kind of work. I still maintain that the appendix should be removed in the vast majority of cases. Even though *believed* to be shut off from the peritoneal cavity, as to which there can be no degree of certainty, nevertheless it is incomplete and dangerous surgery to leave a gangrenous or perforated, in short, an infected, appendix within the abdomen. Incomplete because only the first portion of the operation—that of evacuating the collection—has been done. Dangerous, because there is left in the belly cavity a diseased and infected organ which is capable of giving rise to more trouble in the shape of a recurrent collection at the site of the original abscess; or lymphatic absorption with its sequelæ; or septic phlebitis and septic thrombosis with their train of serious consequences. That the peritoneal cavity may be shut off is true; that the lymphatic and blood-vessels may be occluded is probable; but to tell this to a certainty is entirely impossible, while, on the other hand, there is absolutely no doubt that an infected appendix is present. Therefore, the rule that works best in the majority of instances is the only good working rule, for by means of it more human lives are saved, and fewer complications are met with; while it enables us to escape the destructive sequelæ wrought in many cases,—namely, secondary collections; rupture of abscesses into the



PLATE I.—Showing pin lying within the stomach.

hollow viscera; matting together of coils of bowel occasioning intestinal obstruction; obstruction due to the contraction of the original abscess wall, made up in part of coils of intestine; cheesy degeneration followed by an opening of the lumen of one or more of the included coils of intestine necessitating bowel resection, entero-vesical fistula, entero-bronchial fistula, ordinary fæcal fistula, many of which do not heal spontaneously, as we would be led to believe by the opponents of the radical operative procedure, but require extensive plastic operations, which, I regret to say, are not always followed by cure; the occurrence of ventral hernia; and extensive suppuration of the abdominal wall through infection, together with cheesy degeneration of the tissues of the abdominal wall. In cases where this incomplete variety of surgery has been done, I have frequently had to operate, not only to save the patient's life, but to correct the defect of the original operative procedure, which consisted, as already mentioned, simply in the evacuation of the appendicular abscess. I have no hesitancy in making this statement, as my experience in dealing with many cases warrants it. By the proper disposition of gauze, and only by this, can the appendix, in the presence of pus or infectious material, be removed with safety. I have not infrequently used as many as 175 pieces of gauze in a single operation of the kind referred to.

The occasional operator, or the one who is not practically familiar with belly work in general and its many complications, I would caution against radical appendical work. I know that many infected appendix cases call for the greatest amount of skill; in fact, there is no class of cases that is capable of taxing the expert operator more than some of the cases referred to.

Treatment of the Stump.—In the treatment of the stump my practice for a long time has been to excise the appendix, cutting it completely out of the cæcum with a pair of curved scissors. It is just as simple to close a wound in the cæcum, and often simpler, than to close a wound in the wall of the

intestinal canal elsewhere, the result of other causes. What suggested this form of treatment to my mind was the infection of the walls of the cæcum, the result of embedding into it the base of the diseased appendix. It seems to me to be the planting of a highly septic seed in a fertile ground, to be followed by a sure and prolific harvest, which sooner or later must be gathered and disposed of by the erection of appendical tombstones. I have seen abscess in the wall of the cæcum as a sequel of the latter method of treatment of stump, hence I shall not argue further in its favor. Gangrene of the caput coli is occasionally met with in severe cases of appendicitis. The patches of necrotic tissue of the cæcum may be excised and the opening or openings closed. If, however, the entire head of the cæcum is involved, it is safer by far to wall off the affected area from the general peritoneal cavity and allow nature to dispose of the necrotic tissue, and subsequently, if necessary, close the resulting fæcal fistula.

Drainage.—Pus cases under all circumstances call for drainage, one or more pieces of gauze is the material I use in the majority of instances to accomplish this. Where the abscess occupies the pelvis I use, in addition to gauze, glass drainage. It is my practice to use iodoform gauze, and yet I am familiar with the arguments against its use,—namely, the danger of absorption and its not draining so well on account of the meshes being occupied by the chemical. I have never had occasion to regret using it, therefore I am loath to make a change, it having served me well so many times. When I drain for otherwise uncontrollable hæmorrhage I use simply sterilized gauze.

The suture of the wound can be disposed of in few words. This is best accomplished by the interrupted or buried suture, except in the operation of splitting the muscles, when tiers of the continuous catgut suture are used. The material for interrupted suture is worm-gut; for buried suture, silver wire.

In conclusion, I would say that I am even more convinced than ever of the propriety of operation in acute appendicitis as soon as the diagnosis has been made, providing that this is done a few hours after the onset of the first pain.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 27, 1897.

The Vice-President, ANDREW J. McCOSH, M.D., in the Chair.

CASE OF COMPLETE TRAUMATIC RUPTURE OF THE URETHRA.

DR. L. W. HOTCHKISS presented a young man, twenty-two years of age, who, on the 28th of last June, while riding a bicycle, was thrown and fell astride of a post, injuring himself in the perineal region. Despite considerable pain and hæmorrhage he took the train from Yonkers to New York, walked to the police station, and from there to the hospital. Upon his arrival there an examination showed wide-spread ecchymosis and swelling of the scrotum and of the entire perineal region, and a small lacerated wound upon one side of the scrotum. An unsuccessful attempt was made to perform perineal cystotomy. The hæmorrhage had been so severe that the man had almost collapsed on the table, and a large subcutaneous saline injection was given. The wound was packed and patient put to bed.

On the following day the case was seen by Dr. Hotchkiss. He found that there was a complete rupture of the urethra, which became at once evident on enlarging the scrotal wound. A catheter was inserted into the urethra through the meatus, coming out through the lacerated wound in the scrotum. The corpus spongiosum urethræ, about an inch in front of the bulb, was completely and smoothly divided and its ends retracted for at least half an inch. The lacerated wound in the scrotum was enlarged, and the ends of the ruptured urethra easily brought together and stitched with catgut. A perineal cystotomy was then made and the bladder drained by siphonage for several days. Before the completion of the operation the patient's condition became so desperate that transfusion was necessary. He quickly rallied, however, and made a perfectly smooth recovery.

Subsequent to the operation there was a slight narrowing of the urethral calibre, which yielded readily to the passage of sounds. At the present time (about four months after the injury) he can take a full-sized sound, No. 30, and has no symptoms of stricture.

DR. L. B. BANGS said he thought the good result in the case reported by Dr. Hotchkiss was due to the fact that radical measures were at once resorted to. In any case of traumatic rupture of the urethra we should proceed at once to make a surgical wound out of the lacerated one, and, if possible, suture the severed ends of the canal, the bladder being drained through a perineal opening. The danger of delaying was illustrated by the following case, which had recently come under his observation: A man was caught between the buffers of two freight-cars, producing a fracture of the pelvis and complete rupture of the urethra. The surgeon who saw the case did a perineal section, through which he emptied the bladder, but no attempt was made to bring the two ends of the ruptured urethra together, and the latter, anterior to the wound, became occluded. Some months afterwards, when Dr. Bangs was called to see the patient, he found a considerable deposit of cicatricial tissue about the lacerated urethra, and it necessitated quite a long dissection before the continuity of the urethra could be restored.

THE REMOTE RESULTS AFTER OPERATION FOR RENAL TUBERCULOSIS.

DR. L. BOLTON BANGS read a paper with this title, for which see page 14.

DR. C. K. BRIDDON said that for a number of years past he has been of the opinion that renal tuberculosis, when only one kidney is involved, is most successfully treated by operative measures. With the cystoscopic method of investigation now at our command, the diagnosis of these cases should be made earlier, and the future operations in this field will probably be even more successful than those of the past.

DR. B. FARQUHAR CURTIS said his personal experience with cases of nephrectomy for tuberculous kidney was limited. In two such cases the diagnosis was not corroborated by a thorough pathological study of the removed kidney. One of the cases was a man whose kidney was removed three years ago for

supposed tuberculosis, and he has remained well up to the present time. In the second case, that of a woman, operated upon a year ago, the kidney was found in a condition of pyonephrosis; it was greatly enlarged and adherent to the duodenum; during its removal the duodenum was wounded and had to be sutured. The patient made a good recovery and there was a temporary improvement in her strength and weight.

The speaker said he considered nephrectomy for renal tuberculosis worth while doing, even if it only relieves the patient from the urgent vesical symptoms which are usually complained of in these cases. He emphasized the importance of removing the affected ureter, together with the kidney, because if the ureter is left it is very apt to give rise to symptoms later.

DR. BRIDDON said that about three years ago he operated on a woman for renal tuberculosis, removing the kidney, but leaving the ureter behind. Up to the present time the woman's general condition has remained excellent, and she has shown no symptoms that would point to tuberculosis of the opposite kidney, in spite of the fact that the tuberculous ureter left behind has discharged more or less continuously since the operation.

DR. GEORGE WOOLSEY said that in only two instances had he been able, for any length of time, to keep track of patients who had been operated on for renal tuberculosis. One of these was an Italian, who came back after about a year on account of a fistula, which was traced to one of the silk ligatures on the pedicle, and which was cured by its removal. Otherwise he appeared to be enjoying good health. The second patient was a man in business in the West Indies, who, four months subsequent to the operation, reported that he had been well enough to return to his work, which was arduous, although he had been confined to bed for many weeks prior to the operation on account of bladder symptoms.

Dr. Woolsey referred to the difficulty of convincing one's self of the condition of the opposite kidney. As an illustration of this a case was reported at the recent International Medical Congress at Moscow, during the discussion of ureteral catheterization: in the case referred to catheterization of the ureters demonstrated—as was believed—that one kidney was diseased while the other was healthy. The diseased organ was removed, and when the patient died, on the following day, it was found that

the opposite kidney contained only a single healthy pyramid, the rest being reduced to a large pus-sac.

DR. WILLY MEYER said the most important element of success in the operation for renal tuberculosis is to make an early diagnosis, and there lies the difficulty. The difficulty especially arises if the tubercle bacilli are not found in the urine after repeated examinations. If a patient—especially a young patient—presents himself, who, having been apparently well and without any history of gonorrhœa, is suddenly seized with painful and frequent micturition, perhaps with hæmaturia, and if these attacks are repeated at intervals, a strong suspicion of renal tuberculosis should be entertained, particularly if the patient belongs to a tuberculous family. Dr. Meyer stated that primary descending tuberculosis of one kidney is much more frequent than an ascending infection. If the microscope shows signs of renal disease, but no tubercle bacilli are found in the urine, the aid of Koch's tuberculin might be invoked as a diagnostic test. Koch has employed this in thousands of cases of tuberculosis of the lungs without harm.

Another very important aid to the diagnosis is the cystoscope. If that instrument discloses the presence of tubercular ulcerations about one ureteral orifice, we have undoubted proof that we have to deal with a descending renal tuberculosis. In one case coming under his observation an early diagnosis was made by this means, the affected kidney was removed, and the patient has remained in perfect health up to the present time,—that is, for about one year and a half. In another case, a man, aged forty years, with a history of gonorrhœa eight years previous to the time he came under observation, there was a sudden onset of painful and frequent micturition, and one attack of hæmaturia; the urine was turbid but contained no tubercle bacilli; the cystoscope showed distinct ulceration surrounding one ureteral opening, and there were also a few ulcerations in the neighborhood of the mouth of the opposite ureter. The patient's bladder was so small that it was impossible to drain the kidney. The kidney which seemed to be most affected was laid bare, and as its surface was studded with tubercular foci it was removed. The patient improved after the operation, but recently the symptoms on the opposite side have become aggravated. The fact that both kidneys are affected, the speaker said, should

not be regarded as a contraindication to the removal of the primary seat of the disease, if that can be located. It has been shown that by removing the kidney which is most affected we improve the condition of the patient materially. As regards the removal of the ureter at the same time as the kidney, that of course is the best thing to do, if it can be done without prolonging the operation to a dangerous extent; its complete removal requires a deep dissection, and these patients are often in a poor condition, and unable to bear a prolonged operation. Instead of removing it, it would perhaps be preferable, after its division, to stitch it into the lumbar wound and inject through it an emulsion of iodoform into the bladder.

In conclusion, Dr. Meyer expressed the opinion that tuberculosis of the kidney could also appear in the form of a "cold abscess" of the kidney. It certainly is of rare occurrence. In the cases he had seen the specimens presented a sacculated pus-kidney with the formation of tubercles in the pelvis. They impressed him as being cases of cysto-pyonephrosis, the renal disease, which is so frequently found bilateral, occurring in a tuberculous patient.

DR. MCCOSH said he was glad to see that Dr. Bangs had modified his views regarding the value of the climatic and hygienic treatment of renal tuberculosis, as compared with the operative. Dr. Bangs's conclusions were very similar to those reached by Israel, who at the meeting at Moscow reported twenty nephrectomies for tuberculosis, occurring in his own practice; of these, if he remembered correctly, from 30 to 40 per cent. were comparatively well at a period of one year or longer after the operation.

The speaker said he thought the views formerly held by Dr. Bangs concerning the value of the hygienic treatment of renal tuberculosis, especially in the earlier stages of the disease, cannot be entirely dismissed. In some cases, during the incipiency of the disease, the patients would be better off if they were not subjected to an operation, but were sent to some suitable climate and given proper care. On the other hand, the majority of cases should be operated on, nephrectomy always being preferable to nephrotomy. Even if we know that there is grave trouble in other parts of the urinary tract, it is perfectly justifiable to perform nephrectomy. This fact was well illustrated in a very

desperate case of his own: the patient was a woman who had distinct tubercular disease involving one kidney, and there was presumable evidence that the opposite kidney was also affected; she also had an ulcer on the floor of the bladder about two inches in diameter. One kidney was removed, together with its ureter. Since the operation the woman has gained thirty-five pounds within a year; she is practically well and is earning her living washing clothes. A number of similar cases have been reported by other observers.

DR. HOTCHKISS said he also had operated on a case, in a seemingly hopeless condition, with a large perinephritic abscess and tubercular kidney. In this case the condition of the lungs was by no means above suspicion, and the patient was reduced to an extreme condition of exhaustion and emaciation. He had opened and drained the enormous abscess, removed at the same time a small tubercular kidney, and had packed the wound with gauze. It had been necessary to infuse saline solution every six hours for several days. This case, which made a good recovery, gained immensely in weight, and reported himself several months later perfectly well.

DR. BANGS, in closing, said that a very extensive review of the literature of this subject had impressed him with the difficulty of obtaining sufficient data upon which to base an intelligent opinion regarding the value of the operative treatment of renal tuberculosis as compared with the hygienic. Observations made from a purely medical stand-point would be both interesting and instructive. The speaker said his own opinion is that an early operation should be performed.

Stated Meeting, November 10, 1897.

The President, FRANK HARTLEY, M.D., in the Chair.

PROCTOTOMY FOR PAPILLOMA OF THE RECTUM.

DR. WILLY MEYER presented a man, sixty-four years of age, who came under his observation at the German Hospital about a year previous, complaining of a rectal trouble which had existed over six years. An examination at the time showed a marked prolapse of the rectum, from the surface of which there sprang a large, papillomatous growth, oozing readily, and which

could only be reduced after considerable manipulation. The patient stated that during the previous six or eight months this growth had been forced out with each stool and had given him much trouble.

On account of the broad base of the growth it could not be reached by simply stretching the sphincter ani. In order to deal with it properly it was deemed necessary to split the rectum posteriorly. After this was done it was found perfectly easy to dissect the growth out of the mucous and muscular coat, in which it was embedded. About two-thirds of the circumference of the rectal wall were involved by the growth. After its complete removal the severed muscularis, the posterior rectal wound, and the sphincter muscles were stitched together, giving a very satisfactory result. The wound healed kindly, and in about six weeks the patient was discharged. He remained well about nine months, when he returned, complaining that his stools contained muco-pus and blood. An examination with the finger shows a slight recurrence at the site of the previous lesion, and a small papillomatous growth can be seen by the aid of Kelly's rectoscope. The growth which was removed about a year ago was regarded by the pathologist as papillomatous; in view of its recurrence, however, it was not improbable that it contained malignant elements.

In the above connection Dr. Meyer referred to the value of rectoscopy and the ease with which it could be carried out. The Kelly rectoscope is readily introduced, the patient being in the knee-elbow posture, and with the aid of the head-mirror one can see up to the beginning of the sigmoid curvature. With practice one can guide the tube around the curves of the rectum.

The speaker said he usually performs proctotomy and major operations on the rectum with the patient in the knee-elbow position, which considerably reduces the hæmorrhage.

ROBERTS'S OPERATION FOR PROLAPSUS RECTI.

DR. WILLY MEYER also presented a woman, forty-three years old, who had come under his observation a little more than a year previous, presenting a marked prolapse of the rectum, to which she had been subject for fourteen years, the mass having gradually increased in size until it was as large as a child's head.

For six months this mass had protruded continuously from the anus, making her life miserable.

On October 8, 1896, the woman was operated on by Dr. Meyer, Roberts's method being followed. The operation, which was performed with the patient in the knee-elbow position, consists in making a wedge-shaped incision through the skin, sphincter muscles, and posterior wall of the rectum, and removing a triangular piece of these tissues. In this case the operation was rendered more difficult than usual on account of the fact that posteriorly to the rectum there was a large hernia, containing, as it seemed, intestine and omentum or mesocolon. The speaker said he found it necessary to stitch the peritoneum layer by layer and infold it. He then stitched the rectum and the sphincter ani.

The patient entered the hospital two weeks before the operation was performed; during this period she was given frequent cathartics and enemas, and after the operation the bowels were kept locked for eight or nine days. This insured primary union. On account of the rupture complicating the rectal condition, the patient was kept in bed for sixteen weeks following the operation. During this time she grew so stout that when she left the bed her legs were not strong enough to carry her for some time afterwards. By means of thyroid extract her weight of 240 pounds has been reduced forty pounds, and she is now able to attend to her household duties and walk as much as she likes.

The prolapse of the rectum has not recurred. Eight weeks ago, while the patient was lifting a heavy weight, she felt something give way, and an examination showed that her post rectal rupture had again appeared. Dr. Meyer said he had seen a rupture similar to this one following excision of the os coccyx.

DR. CHARLES K. BRIDGON said that about two months ago a woman, seventy-two years old, had come under his observation with malignant disease involving the anus and rectum. The tissues surrounding the anus for a distance of one and a quarter inches were involved in the growth; there was a fistulous opening communicating with the rectum, which was involved for a distance of about two inches, as was also the posterior vaginal wall.

The patient was operated on in the dorsal position. A circular incision was made, taking in the whole mass and passing

into the ischio-rectal space on both sides. The operation presented no special difficulty, with the exception of removing the posterior vaginal wall, which was very much invaded. Nearly three inches of the rectum were removed. A plastic operation was done on the vagina, so that the woman afterwards presented a perfect perineum and vaginal wall. There was no stricture and an almost faultless anal aperture. Within a month after the operation the patient had considerable control over the evacuations from the bowels, incontinence only proving annoying at times, when there was diarrhœa.

DR. B. FARQUHAR CURTIS endorsed what Dr. Meyer had said regarding the value of rectoscopy by the Kelly method. The position of the patient during the examination he regarded as even more important than the kind of instrument employed. If the pelvis is raised, so that the intestines will descend towards the diaphragm and air will enter the bowel, there is a very free exposure of the lower part of the bowel. The ordinary Sims-Kelsey speculum of wire will answer very well for the average case; it is only in those cases where there is marked curvature of the rectum that the deep speculum is necessary. In a case coming under his observation a year ago, where there was an obstinate ulceration of the rectum which extended up for a distance of five or six inches, he was able to satisfactorily expose and cauterize the lesion after elevating the pelvis, resulting in a complete cure in a few weeks, which has remained permanent.

AMPUTATION OF THE HIP FOR A SARCOMA OF FEMUR IN A CHILD ELEVEN YEARS OF AGE.

DR. W. B. COLEY presented a patient, together with the specimen and a photograph of the case, before operation. The history of the case is as follows:

J. A. N., female, eleven years old, without hereditary history of malignant disease, and previously in perfect health, in February, 1897, fell down a flight of stone steps and injured the right knee. Slight swelling and considerable pain followed. Neither the swelling nor the pain subsided, but both continued to increase. Three months later there was a well-marked tumor on the inner side of the knee, just over the condyles of the femur. This grew very rapidly, and soon began to affect the patient's

general health. She continued to go about, and was taken to a number of clinics and dispensaries in New York.

Dr. Coley first saw her on July 24, 1897. Examination at that time showed the whole lower end of the left femur uniformly enlarged, the greatest circumference measuring sixteen inches, while the corresponding measurement on the other side was only ten inches. The skin was tense, shining, and of a purple color. The tumor was fairly firm in consistence, and had all the characteristics of a rapidly growing sarcoma. The muscles of the thigh were markedly atrophied. The patient had evidently lost much flesh and was very anæmic. Immediate amputation of the hip-joint was advised, and on July 28, at the Post-Graduate Hospital, with the assistance of Dr. S. Lloyd and the house surgical staff, he operated by Dr. Wyeth's bloodless method. Time of the operation, thirty-five minutes; time for disarticulating and removing the leg, twelve minutes. The remaining twenty-three minutes were consumed in stopping the hæmorrhage, great care being taken to ligate the smallest vessels. The patient rallied well from the operation. Temperature never rose above 101° F., and was practically normal after the third day. Small iodoform-gauze drain was left in, and removed on the fourth day. The wound healed by primary intention without any suppuration. The child gained rapidly in flesh and strength, and left the hospital on the twenty-eighth day.

Microscopical examination of a section showed the tumor to be a pure spindle-celled sarcoma, originating, probably, in the periosteum and beginning to involve the knee-joint. The photograph of the leg taken before operation and the carefully dissected specimen give a good idea of the size of the tumor.

He believed that exploratory incision in a rapidly growing vascular sarcoma could but increase the danger of recurrence, on account of the liability of infected cells entering the blood-current and being carried to other parts of the body. The diagnosis in this case was sufficiently clear to justify him in operating without the aid of exploratory incision.

TRANSACTIONS OF THE SECTION ON GENERAL SURGERY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Stated Meeting, October 8, 1897.

W. W. KEEN, M.D., in the Chair.

EXCISION OF SUBCLAVIAN VEIN.

DR. JOHN B. ROBERTS presented an aged woman, who, on April 13, 1897, had been subjected to operation for recurrent secondary carcinoma, occupying the infraclavicular and clavicular regions. The right mammary gland had been removed eight or ten years previously for carcinoma, at which time the axilla had been opened and the lymphatic nodes removed. One or two secondary operations had been done to remove recurrent masses in the neighborhood of the clavicle. The last operation was performed a year previous to the operation about to be described.

It was evident that the involvement of the clavicle would necessitate excision of the middle portion of that bone. The carcinomatous tumor had invaded the clavicle at its middle and involved the surrounding soft parts. It was about as large as a hen's egg. The skin was incised, the clavicle exposed, and about three inches of the middle of the bone sawed out. The infiltrated tissue was cut away with great care, exposing the subclavian artery and vein. The vein had in its anterior wall two or three small nodules of carcinomatous material. A hæmostat was used to grasp and occlude the vein outside of these small masses, which were about the size of split peas. A second hæmostat was similarly applied to the vein near the sternal end of the clavicle, at the point where section of the bone had been made. The intervening portion of the subclavian vein, about a half-inch in length, in which were located the little nodules, was then cut away. The cut ends of the vein were closed by a

continuous catgut suture as the lips of an amputation wound might be united. The hæmostat on the outer end was then removed to see whether the suturing was sufficient to stop bleeding. As bleeding took place between the sutures, the hæmostat was reapplied.

During sewing of the inner portion of the vein the subclavian artery, which was exposed, was accidentally punctured with the point of the needle. From the little orifice a tiny spurt of blood escaped. A hæmostat was used to stop this arterial bleeding and so applied as to pinch an exceedingly small portion of the arterial wall. It was also necessary to put two hæmostats upon the sewed end of the vein nearest to the sternum. The three hæmostats upon the vein and the one upon the subclavian artery were allowed to remain. The skin incisions were sutured, except where the four hæmostats protruded between the edges of the wound. The dissection exposed the loose tissue outside of the upper portion of the pleura at the top of the chest, but the pleural sac was not opened.

An ordinary dry dressing was applied and the patient put to bed. No special symptoms occurred, except pain of a pleuritic character, first on the left and later on the right side, during the next twenty-four hours. These pains were relieved by sinapisms, dry cupping, and adhesive plaster strips to the side of the chest. The hæmostat on the outer portion of the vein was removed on the second day, the two hæmostats on the internal portion of the vein and the one on the artery were removed at the end of three days. Subsequently there seemed to be evidence of a pleurisy at the right base. She had had what was called bronchitis and pleurisy a few weeks before operation.

The patient made a rapid recovery, which was only delayed a little by the opening between the flaps caused by the exit of the hæmostats requiring some time to heal by granulation. Her arm became only moderately swollen and congested as a result of the interference with the venous return. This disappeared in a few days. No special disability seems to have been caused by the removal of the clavicle or the lesions of the vascular system.

DR. KEEN said that in cases of carcinoma hitherto he had always dissected involved glands away from the vessels as carefully as possible, but it is doubtful if this course is always wise, as it is impossible to remove all microscopic foci of disease. In the future he would be disposed to resect a portion of the vein

if it was involved. He inquired of Dr. Roberts why the suture was used to close the vein instead of ligature?

Dr. Keen was also interested in the employment of the suture in the wound of the artery, and referred to the importance of this method, which has been brought before the profession prominently by the recent work of Dr. Murphy.

SUGGESTION FOR HASTENING CONSOLIDATION IN DELAYED UNION OF FRACTURES.

DR. JOHN B. ROBERTS remarked that since one of the effects of circulatory changes in osseous tissue is a tendency to encourage growth of bone, this physiological fact had for a considerable time seemed to him to present a possible means of increasing the formation of callus at the seat of fracture. Recently he had under his care a patient of forty-eight years in whom he made an attempt to act on this suggestion. The man had sustained a fracture of both legs five months previously, and in both deformity and overlapping with greatly delayed union had occurred.

Dr. Roberts excised a portion of the tibia and fibula at the seat of the deformed fracture in the left leg and wired the tibial fragments. The other leg, which was in a similar condition of non-union with overlapping and great rotary deformity, was not disturbed, but was left for subsequent operative treatment. He selected for operation the leg in which deformity and non-union were the more marked. Some suppuration took place and little or no attempt at union occurred. The wire was then removed. After waiting two months and finding the fracture still ununited, and showing little evidence of the formation of callus, he concluded to keep the limb in a state of chronic congestion by having the man wear a rubber bandage round the lower portion of the thigh, applied so tightly that the foot and leg would be kept blue and swollen from congestion of the veins. He had worn this bandage, supplemented by a gypsum splint, for nearly three and a half months, when last seen by the reporter. During the latter part of this time he had been walking with a cane, bearing some weight on the injured limb, though the gypsum splint was not such as is employed in the ambulatory treatment of fractures. He encouraged him to do this, so as to increase the activity of the reparative processes at the seat of fracture. The elastic bandage was worn day and night, as tight as he could

wear it with comfort, and the skin beneath it kept in good condition by bathing with alcohol and keeping a small piece of cotton bandage between the skin and the rubber band.

When the patient left the city for his home, a few weeks ago, quite a considerable amount of union had occurred, though the fracture was by no means solidified.

As accessory means of treatment the patient had been given, immediately after the operation, carbonate of calcium and lactophosphate of calcium, as well as tonics, without any apparent benefit. A skiagraph taken of the limb about the time the treatment by the chronic congestion method was begun showed that the fragments were in good condition, though not united.

It had seemed as if the method had aided in causing the formation of callus, although it had to be admitted, however, that during the time of the prolonged treatment of the leg upon which operation was done, the other leg, which was also the seat of a delayed union after fracture, became consolidated.

The number of months that had elapsed from the time of the original injury without union of either fracture made it seem probable that in neither fracture would firm union occur. When the operation was done, the limb was selected in which the greatest amount of abnormal mobility and deformity existed. Five months had elapsed between the time of fracture and the time of operation, and yet neither leg showed complete union. Nothing abnormal was found in the patient's general condition, though the muscles of the limbs were flabby in character. It is possible that there was some undiscovered source of defective nutrition which prevented solidification of both fractures, and that the prolonged treatment gave time for better food and nursing to correct this and result in the production of callus in both legs.

It is possible that the use of thyroid extract might have been beneficial in this case. The observations of Gauthier (*Journal of the American Medical Association*, August 21, 1897, p. 357) are said to indicate that delayed union of fractures may be favorably influenced by internal treatment with this remedy.

As to the usefulness of the arm after operations for removal of the breast, it is difficult to give a prognosis. In a case recently under Dr. Keen's care, in which the nature of the tumor was doubtful and there were no enlarged axillary glands to be felt, he had saved the pectoral muscles. He merely explored the

axillary region with the finger. At the present time, eight months after the operation, the arm is very stiff and helpless. On the other hand, in a case in which both breasts were involved, bilateral operations were performed and both pectorals removed from each side, yet this patient had much better use of her arms than the case just mentioned.

DR. ROBERTS stated that, as he had experienced difficulty in applying lateral ligatures to veins, he was in the habit of clamping the wound with hæmostats, which were allowed to remain until the danger of hæmorrhage had passed. In the case reported, he had sewed the vein because of the difficulty in passing a circular ligature. He agreed with Dr. Keen as to the advisability of removing portions of the vein if adherent to tumor.

PRELIMINARY REPORT OF A CASE OF GUNSHOT WOUND OF THE LUNG.

DR. JOHN CHALMERS DA COSTA presented a man, George P., eighteen years of age, who was brought to the Jefferson College Hospital by Dr. George Butcher, of Dividing Creek, N. J., with the following history:

On the 5th of last June he engaged in a quarrel with some Italian workmen, one of whom drew a revolver and shot him in the back. After receiving the wound he ran about 100 yards, staggered, stumbled, and fell unconscious. Dr. W. P. Glanden, of Cedarville, N. J., who saw him one hour after the accident, reports that he was then in a state of collapse. The skin was cold, the pupils were dilated, the radial pulse was imperceptible, the respirations were shallow and labored, and wandering delirium existed. There was copious vomiting. Once, and only once, the patient spit blood, coughing up at one time several mouthfuls of bright red blood.

Reaction was gradually brought about, and the skin about the wound was rendered aseptic. There was but little bleeding from the wound. For some days he improved, but then began to grow gradually worse. On June 16 he was brought to the Jefferson College Hospital, and was seen by Dr. Da Costa for the first time about noon of that day (eleven days after the injury).

He was very much exhausted by the journey. The pulse was 100, respirations 32, and temperature 99° F. A bullet-wound was found on a level with the spine of the fifth dorsal

vertebra, six and a half centimetres to the right of the vertebral spines. No wound of exit was found. The wound was suppurating slightly, but neither blood nor air came from it. A harsh cough existed, but there was no hæmoptysis. In front and to the side there was absolute dullness on percussion to just below the nipple-line. Respiratory sounds and vocal fremitus were absent over the dull area. Above the nipple the percussion-note was tympanitic. An X-ray picture was taken. The patient was so exhausted that no examination was made over the posterior portion of the chest. The apex-beat was pushed outward almost to the nipple.

A diagnosis was made of hæmothorax. It was decided, after consultation with Dr. Hearn, that the proper course was to await developments, and orders were given to keep the patient absolutely at rest. During the day the condition remained practically the same, but early in the evening it became suddenly and rapidly worse.

At 9.45 P.M. the condition was as follows: Temperature $97\frac{2}{3}^{\circ}$ F.; pulse 132 and very weak; respirations 36, shallow and sighing; weakness to the verge of syncope; pain in the right chest; dyspnœa; icy cold extremities; cold sweat on forehead; face of a deadly pallor, with livid lips and sunken eyes; pupils widely dilated; dimness of vision; excessive restlessness, the patient tossing his arms about; great thirst; and attempts at vomiting. Chest was absolutely dull on percussion up to the second rib; no breath-sounds were audible on the injured side, and the intercostal spaces looked distinctly bulged. The apex-beat was noted as external to the nipple. It seemed quite clear that a profuse secondary hæmorrhage was taking place. The patient was given ether. A vein was bared in front of the elbow, the tube of Collin's apparatus was inserted, and some hot saline fluid was thrown into the circulation. The improvement in the condition was rapid and decided. During the operation two quarts of saline solution were thus administered, and to this intravenous injection the preservation of life is undoubtedly due. An aspirator-needle was introduced into the pleural sac and pure blood flowed out, confirming the diagnosis.

A U-shaped flap was cut, and on turning this up the bullet-wound was observed between the fifth and sixth ribs. About six inches of both the fifth and sixth ribs were resected, and on

opening the pleural sac there was a furious gush of blood. The blood was mixed with air, and violent cough began. The wound was partly plugged, and the blood was permitted to flow out slowly. No clots were present. Practically all of the blood was caught, and it was found to measure one gallon and one-half pint (136 ounces).

Examination of the lung showed that the lower lobe was lacerated, sloughing, and bleeding profusely. Ligatures and suture-ligatures would not hold. Catch-forceps failed to arrest the bleeding. The operator then grasped the lung and thus controlled the hæmorrhage. To have simply packed gauze against the bleeding point would have done no good, as the attempt would merely have pushed the lung away and the packing could not have been tightly applied. While the lung was compressed with the fingers the entire pleural sac about it was filled with sterile gauze. This afforded a base of support. The fingers were now relaxed and iodoform gauze packing was forced against the bleeding surface. The sterile gauze previously introduced kept the lung from receding, and the pressure of the iodoform gauze controlled the bleeding. The ends of the pieces of gauze projected from the wound and the flap of soft parts was sutured in place. The bullet was not sought for.

The entire proceeding occupied thirty-five minutes from the time ether was started. After operation the patient was profoundly shocked, but by 2 A.M. he had reacted. During the ensuing five days he was delirious and very ill, but by the end of the first week was clearly out of danger. Several times during convalescence inspection of the pleural cavity by means of an electric light and mirror showed the existence of great masses of slough. These sloughs were as large as the hand, and were removed by forceps. Examination showed them to be composed of lung tissue. Practically the entire lower lobe sloughed away. The gauze packing was removed June 22. There was no bleeding. Measurement showed that forty-two square feet of gauze had been used.

The man is now strong and well. The upper lobe of the lung is functioning actively. There is a large opening in the chest from which there is a daily discharge of about one ounce of sero-purulent matter. Examination with a mirror and electric light shows a considerable cavity. This cavity has diminished

about one-fourth in size during the past two months. In view of the youth of this patient, the mobility of his ribs, and the considerable gap in the bony case of the thorax, it is reasonable to expect a more decided diminution in the size of the cavity in time.

A skiagraph shows the bullet in front. It must have passed directly through the lung, and is now embedded in the anterior mediastinum, where it is doing no harm. Dr. Da Costa said that this case was of interest for several reasons.

(1) Because of the fact that the condition was due to secondary hæmorrhage. Other cases operated upon were instances of primary hæmorrhage.

(2) Because of the great amount of blood in the pleural cavity. This great quantity was the product of two hæmorrhages. Cases are on record in which two quarts of blood were found on opening the pleura. Over four quarts were found in this case. The first hæmorrhage was probably about two quarts in amount, and the second was nearly equal to it in quantity.

(3) The method of arresting the bleeding. Michaux treated a case by stuffing iodoform gauze *into* a wound near the root of the lung. This was impossible in this case. It was necessary to fill the pleura with gauze to obtain a base of support before packing could be successfully used.

(4) The entire absence of clots, although some of the blood had been in the pleura for eleven days. This is confirmatory of the well-known views of Pagenstecher.

(5) The benefit derived from the intravenous use of two quarts of hot saline solution.

(6) The removal of large sloughs of pulmonary structure.

DR. KEEN thought it the most remarkable case of pulmonary surgery he had ever known. The method adopted of arresting the hæmorrhage by preliminary packing around the bleeding part of the lung to get a good backing before applying the iodoform gauze to the bleeding surface was very ingenious and much to the credit of the operator. To have used all iodoform gauze would have been dangerous, on account of absorption. The bullet is giving no trouble and need not be disturbed. In regard to the question of closing the cavity, Dr. Keen stated that the remarkable diminution in the size of the wound would lead him to advise against further operative measures at this time.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, November 1, 1897.

TREATMENT OF CASES OF SECONDARY SYPHILIS COMPLICATED WITH CHRONIC APPENDICITIS.

DR. ORVILLE HORWITZ read a paper with the above title, for which see page 74.

POINTS IN THE TECHNIQUE OF THE OPERATION FOR APPENDICITIS.

DR. JOHN B. DEEVER read a paper with the above title, for which see page 78.

DR. RICHARD HARTE said, with regard to mercury in the treatment of chronic appendicitis, he agreed with Dr. Horwitz's ideas. He thought that the benefit one gets from this treatment is the combating of the bacterial element in the case, as many authorities recognize that bacteria play a very important part in the production of disease. In other words, the drug simply keeps the patient's intestinal tract clean. He had used the remedy several times himself and was sure it has brought about improvement.

As to the length of the incision in operations for appendicitis, this depends upon the case, upon the thickness of the abdominal walls, and upon the condition of the appendix. If the appendix has a short mesoappendix it is impossible to remove it through a small wound. A short time ago he removed an appendix that was deep down in the pelvis, and the only way he could succeed was by first dissecting it away. In all cases where the appendix is situated deeply the first thing to do is to free it, and it is useless to try to drag it out through a small opening.

With regard to the suture, he thought that is a subject which

has been overlooked for a long time, and more attention should be paid to it. If this were done there would be fewer cases of hernia after operation. He recalled a number of cases of hernia following operation where no attempt had been made to properly approximate the edges of the wound. Apparently it has been thought that everything was protected if the opening was covered, and the skin incision had been closed without any thought of the peritoneum. In his judgment these wounds should be closed layer by layer. As far as buried sutures go, he did not care for them, as he thought they were inventions of evil rather than good. No one who had large experience with these sutures seems to speak well of them, and he had to remove a number of them. Silver wire and catgut are the same; the ideal suture is the absorbable one.

As to drainage, he said that while in some cases of acute appendicitis it is imperative that some sort of drainage should be made, he did not consider gauze an ideal drain by any means. It simply furnishes capillary attraction, and in a short time the gauze which is filled with iodoform will become clogged,—that is to say, the meshes will,—and in that way the surgeon does not get satisfactorily rid of the products of inflammation. He thought that the glass-tube drain, with the washing out of the abdomen every two hours, gave the best form of drainage. He had saved two or three cases of general septic peritonitis where the abdomen was filled with pus, and had done it by this method. He did not think any other mode of treatment would have saved them. He had found that some cases drain better by turning the patient over on the side or making him lie on the abdomen. In this way he had drained cases that otherwise could not have been drained at all. In this way no opportunity exists for the products of inflammation to burrow down, which would often cause an immense amount of trouble.

As to the best means of dealing with the stump, he agreed with Dr. Deaver. He was in the habit of cutting off the appendix about one-eighth of an inch from the cæcum, and then throwing up the flap and stitching it over. He had seen on two or three occasions a second attack follow where a long stump had been left. Cutting the root of the appendix off closely gives the best results.

As to washing out, it is very well in those cases of general

infection where the abscess cavity has not been shut off and where the abdominal cavity is one large septic mass. He was strongly in favor of flushing out every two hours with a saline fluid.

He still thought it was bad surgery to remove the appendix in all cases, but it was true that, taking a long series of cases, those do better where the appendix has been removed than where an abscess had been simply opened and drained.

DR. JAMES M. BARTON said that he usually makes his incision over the tender appendix, and then, if necessary, enlarges it in whatever direction appears most desirable. Recently, finding it under the rectus, he was able to remove it by splitting the muscle an inch and a half. This made a very desirable wound to close and one very unlikely to be followed by hernia.

He was in the habit of removing the appendix more frequently than he formerly did, though he was by no means sure that it was a change for the better. He had never considered the presence of pus as any reason for its non-removal where it was possible to surround the parts with gauze, but where the anterior abdominal wall forms a portion of the wall of the abscess, where firm adhesions are between the abscess and the general peritoneal cavity, and where the abscess has existed for so long a time that the appendix has probably sloughed and separated, it seemed to him that the necessity for tearing up the adhesions that effectually protect the general peritoneum is not great.

Some years ago he reported twenty-two cases in which he had operated without removing the appendix, and they all recovered, but two of them, having a return of the disease, recovered after the removal of the appendix at the second operation. Since then he had operated on quite a number of cases, and in probably one-fifth of them he did not remove the appendix. All recovered where the appendix was not removed. In a boy now in the Jefferson Hospital, from whom he removed the appendix recently, the disease was so far advanced that the gangrenous appendix came off in his fingers as he took hold of it. He ligated the stump, but it was quite unnecessary as it was thoroughly occluded, and he was sure he would have made quite as complete a recovery if he had never seen his appendix, but merely opened the abscess.

In regard to drainage, gauze drains serum admirably, but he did not think it would drain pus at all; a tube is necessary where pus is present; rubber drains are best, as in handling a patient he is less likely to tear his adhesions on rubber than on glass. One of his patients, on the fifth day after operation, pushed his glass drainage-tube through his adhesions with immediate collapse, and death within half an hour. He examined the parts an hour after death, before he had been removed from the position in which he died, and was particularly struck with the cobweb-like character of the adhesions, though they had been five days forming.

As to washing out after opening an appendical abscess, in the cavity of a well-developed abscess, which has existed for a week or ten days, in which we find the intestines adherent to each other, thickened, hardened, and covered with lymph, he did not think anything less than turning that abscess inside out and scrubbing it would disinfect it.

No injection can produce any material effect on the germs, but only threatens tearing vitally important adhesions.

DR. H. C. DEEVER said that he had always used sterilized in preference to iodoform gauze for drainage, as the capillary is impaired by its meshes being filled with iodoform. Dr. Harte's method of draining with a two-way glass tube and flushing the cavity every two hours may be good, but he thought there was danger of infection by this method, as it requires much attention. It certainly should be done by a skilled nurse, which is not always to be had. As to incision over the tender area of the appendix, he had operated upon cases where the extreme point of tenderness was over the internal abdominal ring as well as elsewhere, other than the normal site of the organ. He always made the incision near the right semilunaris, the centre of which corresponds to McBurney's point, enlarging it as the case required, when he could deal with adhesions with perfect safety to the bowels, iliac blood-vessels, and ureter. He was in the habit of removing the appendix in all cases where the patient's condition would justify him in doing a thorough operation. Where the appendix is removed in these bad cases with abscess, and results fatally, he thought it to be due to a septic peritonitis which is present at the time of operation, or to rupture of a secondary abscess which has not been discovered, and not due to infection the result of the removal of the appendix.

DR. R. G. LE CONTE said that in appendical abscess he did not think the cases always die where the appendix is not removed, as he had seen several where the appendix was left in and the patients were still living. He had also seen cases of abscess in which he had made a vigorous effort to find the appendix, had found it, and they had died. He had a case last winter in a young girl sixteen years of age who had a large appendical abscess. He made a superficial hunt for the appendix, and not finding it, simply drained, the girl making a good recovery. Six months later she developed a hernia at the site of the wound. He again operated to close the hernia, and his primary intention was to do no more; but as there was only a very thin membrane he opened the peritoneum and removed the appendix. It had but few adhesions, was about the normal size, somewhat indurated, and had a small scar towards the tip. In this case the girl had been in perfect health for six months.

DR. J. EWING MEARS stated that he employed iodoform gauze of the strength of 5 per cent. in his operations, both in the abdomen and in the mouth. He had never observed the condition spoken of by some of the Fellows,—that is, the filling up of the meshes with the iodoform so as to render the gauze unfit for drainage or absorption of secretions. If the gauze is removed at sufficiently short intervals he found it to act very well as a drain and as an absorbent.

With regard to the occurrence of ventral hernia following operations for appendicitis he had observed a number of instances, and recently he had been informed by an instrument-maker that the demand for trusses for the treatment of ventral hernias had largely increased since the great increase in the number of operations performed for appendicitis.

DR. H. R. WHARTON related a case bearing on the mercurial treatment of chronic appendicitis. It was that of a boy who had had four attacks of appendicitis at short intervals, and since his last attack had some tenderness in the right iliac fossa, and some thickening in the appendical region, and as reason existed for not operating at that time he suggested full doses of the bichloride of mercury. These were continued for some time, and several weeks afterwards the boy was much better. It is three years since this happened, and the boy has never had any trouble and is now perfectly well.

Another case was that of a man who had had several attacks of appendicitis within a year and was very anxious about his condition. There was some thickening in the neighborhood of the fossa and also tenderness. Some reason existed for not operating at that time, and he advised giving the bichloride of mercury a trial, he agreeing that if he was not better in a few weeks he would be operated upon. He had heard nothing of him since.

As to Dr. Deaver's statement that the appendix should be removed in every case, he agreed with him where it was possible, but he believed there were cases where it was impossible. He always felt much safer when he had succeeded in removing the appendix. He had had three cases in which subsequent attacks were experienced after the opening of appendical abscesses.

In another case in which he opened a large appendical abscess in a boy, the patient two years afterwards died of general peritonitis, apparently arising from recurrent appendicitis.

In another case of appendicitis with abscess that was operated upon without removing the appendix, a large abdominal abscess developed, and was opened some months after the first operation.

DR. JOHN B. DEAVER, in closing the discussion on his paper, said that when most of those who had spoken had operated on a great number of cases, he was sure they would entertain views diametrically opposed to those they had just expressed.

As to the probability of recurrence, after a first attack, he had the necessary data to show that out of 200 cases operated upon in the German Hospital since January 1, this year, 153 of them had had previous attacks.

As to the removal of the appendix in the presence of an abscess, he knew there were differences of opinion, but the more experienced practise and speak as he did. He was morally certain that when the speakers had had as large a number of cases as he had had, and had seen, from leaving an infected appendix within the belly cavity, such ill effects as primary intestinal obstruction; secondary intestinal obstruction; mesenteric pylephlebitis, abscess of the liver; secondary appendical abscess; cheesy degeneration of an overlooked collection which, by including a part of the small bowel, has caused fistula, with consequent resection, enterorrhaphy, etc., they would come to a conclusion different from the one implied in their present remarks,

for it is unnecessary to say that most of the above class of cases perish. If the technique is carried out in proper manner there is not the difficulty one would imagine in removing the appendix in the presence of an abscess.

As to gauze, he had used as many as 175 pieces in one case. In private he always carried his own gauze, cut by himself, as he did not care to use the gauze pads so frequently prepared by nurses. The first step after opening the peritoneal cavity is to properly introduce the necessary number of pieces of gauze, which is by all odds the most important part of the technique, particularly in the presence of septic matter. When the appendix is surrounded by an abscess and is so inaccessible that its removal is attended by any danger, the preservation of the patient from infection depends entirely upon the proper disposition of sterile gauze; if the gauze is properly placed, the risk, so much talked about by those who oppose the removal of the appendix under such conditions, is practically abolished.

As to the cases reported by Dr. Horwitz, he agreed with Dr. Harte as to the manner in which the good effect of the mercury is accomplished,—namely, by keeping the bowels lax. The further care as to living, diet, etc., observed by the patient who is undergoing treatment lessens the likelihood of recurrence. In cases of both acute and chronic appendicitis, strict attention to keeping the bowels loose he had always regarded as most important. If a patient threatened with an attack of acute appendicitis is given a brisk purgative, it is ten to one he will recover temporarily.

Dr. Deaver also remarked upon how few appendices are taken out that do not show microscopically evidences of marked disease. If sections of these diseased organs are made there will be found strictures, or one or many lesions accountable for subsequent attacks. Mercury cannot remove these pathological conditions, any more than can the same drug accomplish cure in organic stricture of the urethra. Every case that has been operated upon in the German Hospital had been studied microscopically as well as macroscopically, and micro-photographs made of all the sections. No one has the right to make a positive statement against the propriety of operation to prevent recurrent attacks unless he has studied the diseased organ microscopically, for macroscopically many pathological changes escape notice.

Making the incision directly over the appendix is proper, but, as it often happens, that the apex or the middle portion of the organ is diseased, he thought it better that the incision should be carried over what would be its normal position.

As to recovery, he said that a large percentage of those acute cases with abscess in which he had left the appendix had died, while the great majority of those from which he had removed it had gotten well. He considered it very important, therefore, to remove the appendix.

He would, however, caution against the removal of the appendix in all cases of abscess-formation, when the operator has not had a rich experience in dealing with pus within the belly cavity. Under these circumstances it would be safer to simply evacuate and defer the removal of the appendix until the patient had recovered from the acute attack.

As to the time of life when appendicitis seldom occurs, he thought that after sixty years of age it was comparatively rare, yet he had seen cases after seventy years. Between the ages of two and forty the greatest number of cases are met with.

As to the silver-wire suture, he used both the mattress and the interrupted suture. An objection to the mattress suture is that it ridges the muscle. This is overcome by the interrupted suture. His success with silver wire had been very good, although it was true he had sometimes to take one or more of them out. The wire can be rendered thoroughly aseptic, does not become absorbed, but encapsuled. He regarded it as the best material for the buried suture.

As to the anæsthetic, he used ether mostly, the A. C. E. mixture to some extent, and chloroform occasionally. He frequently started the anæsthesia with the A. C. E. mixture and continued it with ether. A certain percentage of these cases behave badly under ether. It has been demonstrated that many of them have kidney irritation, the result of the appendical inflammation. These cases, of course, bear ether badly. In the cases where kidney irritation is known to be present he preferred the A. C. E. mixture or chloroform.

While, for the reasons stated by Dr. H. C. Deaver, iodoform may not drain quite so well as the sterile gauze, the strong indication for its use in septic cases is that it is a deodorizer, and by its possession of stimulating properties favors more rapid repair; he regarded it as the best dressing in bad septic cases.

He very often left in a number of pieces of the gauze in bad pus cases. He always broke up the bowel adhesions and wiped everything off with iodoform gauze. He removed the gauze in three days and closed the wound in many cases, while in others, the wound must be left open throughout to heal by granulation. The strength of the gauze he used is 5 per cent. In a certain percentage of the severe pus cases he made no attempt to close the wound, but simply packed it lightly with gauze. These are the cases which have been allowed to go on to abscess formation. He was often forced to operate on these very bad cases, and consequently he saw many instances of hernia following. Very early operation obviates this unfortunate sequel to a great extent. In septic peritonitis after operation he formerly reopened many, but I had never had one recover. McCosh and Abbe had reported a few cases, but he had not been fortunate enough to have one recovery, consequently he had ceased to do the secondary operation. In the class of cases he formerly reopened he now packed the bellies in ice, covering the entire abdomen, front, sides, etc., with ice-bags; give good-sized doses of calomel on the tongue; strychnine hypodermically; assafoetida suppositories, and all nutriment with whiskey by rectum. When there is persistent sick stomach, he applied fly-blister to the epigastrium. With this treatment he had seen excellent results. He recalled the case of a boy in the German Hospital who was treated in this way and whose abdominal walls the house surgeon thought would be destroyed by the prolonged application of the ice, but the young fellow recovered after three weeks of treatment such as had been detailed. He had seen the prolonged application of cold in portions of the body other than the abdomen, as, for example, the anterior surface of the knee, cause local gangrene, but the abdominal walls, owing to their free supply of blood and the free anastomosis between the superficial and deep vessels, do not suffer in this wise from its application.

The treatment above referred to offers, in his experience, the best results, not only when instituted in septic peritonitis following operation, but in septic peritonitis in general. That the prolonged application of extreme cold arrests bacterial infection, alters the soil which would otherwise be favorable for further bacterial propagation, he was convinced from having used it successfully in a large number of cases. The anæsthetic

property of the ice is also well demonstrated. It is seldom that any anodyne is called for when the ice is used methodically. The ice treatment, though, will not accomplish the desired result if used in a half-hearted way. Again, its good effect is seen in the stimulation of the muscular coat of the bowels, in this way favoring the expulsion of flatus with relief of the distention so annoying to the patient, particularly when the maximum amount of the same is in the upper abdomen, pressing upon the diaphragm and embarrassing the heart action as well as respiration.

Those who do not believe in radical appendical surgery in the presence of abscess formation can escape having pus cases, in which they fear complete removal, by adopting the course which he thought to be the only logical one,—viz., that of operation immediately after the diagnosis, granting that the case is seen a few hours after the onset of the original attack. He was free to admit that the danger of early removal of the appendix, in the presence of a small amount of pus, which is capable of forming in two or three hours after the onset of the disease, is, with the proper disposition of gauze, attended by less risk than is removal in the presence of a large purulent collection, even where nature has made an attempt to shut off from the peritoneal cavity. This, again, is only one of the many strong arguments against delay in operation.

He cited the recent case of a boy taken sick in Girard College, at seven o'clock in the evening, without previous illness. Diagnosis appendicitis, by Drs. William S. Janney and Force. Operation at 10.30 P.M. disclosed a perforated appendix and a belly full of pus. Removal of the appendix, irrigation of the belly, with glass drainage, was followed by prompt recovery. He could cite many instances of this character, in which, in his experience, when operated on within six to twelve hours from the onset of the first pain, recovery followed.

He recalled distinctly the case of a woman who was taken sick with severe abdominal pains on a Sunday evening. The following morning the pain persisted. She went to a drug-store and took a dose of castor oil. On the evening of the same day she was seen by Dr. Deaver, when the diagnosis of appendicitis with peritonitis was clear. At nine o'clock that evening he operated, removing the appendix, which was not perforated, but through the walls of which migration had taken place, producing

purulent peritonitis. Appendix removed, belly washed out, glass drainage, recovery. At the end of three weeks she had resumed her position as cook.

There is scarcely a doubt but that both of the cases related would have perished had delay been counselled.

AMPUTATION OF THE UPPER EXTREMITY IN RECURRENCE OF MALIGNANT DISEASE AFTER EXCISION OF THE BREAST.

DR. JOHN B. ROBERTS remarked that the frequent occurrence of malignant disease in the lymph-nodes of the axilla, after excision of the breast for carcinoma, had convinced surgeons of the necessity of freely removing these lymphatic glands and the adipose tissue in the armpit at the primary operation. This procedure, the removal of the pectoral fascia or of the fascia and the muscles and the enucleation of the lymph-nodes below the clavicle, had rendered local recurrence of malignant disease of the breast unusual. Recurrence of the disease in his cases has usually taken place around the axillary artery and vein at the top of the armpit. In secondary operations he had therefore been obliged to remove the tissues so close to the vessels that wounds of the axillary vein had not infrequently been made. Even this sort of dissection had failed to eradicate the disease, and soon induration in the axilla and lymphatic œdema of the arm had proved the advance of the cruel malady.

The futility of such secondary operations had driven him to the conclusion that in these axillary recurrences some more radical method must be adopted; and he therefore submitted for discussion the proposition that disarticulation at the shoulder-joint should be promptly performed in malignant disease of the axilla occurring after the usual thorough extirpation of mammary carcinoma.

It was true that it would be easy enough and sufficiently safe to excise the portion of the axillary vein evidently involved in the secondary growth; but the artery is frequently so surrounded with disease that excision of its walls would also be demanded. Even then all the tissues implicated in the dissemination of the malignant process would probably not be cut away. Simultaneous arterial and venous resection would, moreover, be scarcely less momentous than an amputation through the shoul-

der-joint, and would give far less assurance that the infected structures had all been excised.

About six months ago he suggested such an amputation to a patient who had secondary carcinoma very high in the axilla, and obtained her consent. Finally, however, he contented himself with dissecting away the tissues around the vessels and abstained from disarticulation of the shoulder. Now the disease had returned in the axilla and was too extensive for successful treatment. It was presumably certain that amputation would have enabled him to make a much more thorough removal of diseased structures, without any special increased risk to life, and to have thereby delayed or averted recurrence and necessary death.

He was aware that amputation had been suggested and, he believed, employed for removing the heavy lymph-œdematous limb which occurs from involvement of the axillary lymphatic vessels. His proposition was, however, a different one, in that it advocated amputation and extensive removal of axillary tissues as soon as axillary involvement occurs subsequent to a properly performed primary operation of a radical kind.

DR. R. H. HARTE said that many of the cases of the kind referred to that he had seen he thought would simply have died after such an operation. When secondary involvement appears at the end of a year or two, the cases are usually very much below par, and he should hesitate to perform such a radical operation, as he thought a very large majority of them would die.

DR. J. M. BARTON said that this operation was performed by Sands, of New York, ten or fifteen years ago, and there are other cases on record. He had one himself ten or twelve years ago, and he knew of a number of similar cases in which it had been done. Sand's cases have been recorded. His own was performed at the German Hospital in this city. The patient perished of sepsis twelve days after operation.

DR. JOHN B. DEEVER said that any one who understood the anatomy of the female breast knows that its lymphatics pass to the mediastinal as well as to the axillary glands. When one recalls that carcinoma often involves the inner quadrant of the breast, he did not think we could hope for such a radical operation to be of benefit in the majority of cases. He had seen a number of recurrences in the mediastinum with the characteristic

voice and cough of laryngeal pressure. What he did believe was that more radical operation should be done earlier in the disease than is the common practice.

So soon as carcinoma of the breast is recognized, granting that this is early, and if the patient's general condition is good, his practice was to do the most radical operation, consisting of the removal of the entire gland with the overlying integument, the incision being carried beyond the limits of the normal circumference of the organ. The sternal portion of the greater pectoral muscle, with the overlying fascia and gland still intact, was severed from its origin and reflected outward. The lesser pectoral muscle was next divided and each half reflected. With the arm in the extended position, the best opportunity was offered to remove all of the glandular tissues in connection with the blood-vessels as far up as the clavicle, as well as the contents of the armpit, and the connective tissue covering the side of chest, etc. Before closing the wound a triangular incision was made in the supraclavicular region, the apex of the triangle corresponding to the junction of the sterno-mastoid muscle with the clavicle, the flap is reflected outward and the glandular tissue of the subclavian triangle carefully dissected out. While operations of this character are necessarily extensive, yet if proper care is exercised in controlling the bleeding, shock is of seldom occurrence. He had frequently seen a patient after this extensive operation leave the table with a pulse of 88. So far as the subsequent use of the arm is concerned, he could say from experience that it is good. The clavicular portion of the pectoralis muscle seems to take upon itself largely the function of the sternal portion which has been removed. What he considered a very important step in the operation was the avoidance of injury to the long subscapular nerve which supplies the latissimus dorsi muscle. Interference with the function of this muscle may be attended with more discomfort than that following mutilation of the great pectoral. It is not necessary to say that in comparatively few of these operations can the wound be completely closed. There is no objection to allowing part of the wound to heal by granulation; true, it prolongs convalescence, yet this is of no moment in comparison to the likelihood of recurrence of so serious an affection as carcinoma. In cases of advanced age, poor general condition of the patient, extensive local disease, etc.,

he might think of removing the breast alone, if operation was indicated at all. He would not be understood, however, as advocating the radical operation in advanced disease. On the contrary, if good was to be derived, it was only in carrying out such a procedure while the cases were still in their infancy.

In contrast to the more radical procedure is the extirpation of the gland, with removal of the deep pectoral fascia and the cleaning out of the armpit; this he had done a number of times, but he personally felt that the chances for return were greater than by adopting the former plan. Dr. Roberts's operation should be offered only as a last resort.

DR. W. JOSEPH HEARN said he should hesitate to practise Dr. Roberts's method, although in a case kindly referred to him some time ago by Dr. Keen, he had removed the entire upper extremity including all of the scapula and a portion of the clavicle, and the patient made a good recovery.

In removing the breast he usually made his incision along the inferior border of the pectoralis major. That enables him to expose the vessels without hæmorrhage. He thought it was possible to clean the axilla almost as well as if the arm were removed, especially after the pectoral muscles had been removed. If both the artery and vein should be involved it would probably be well to remove the arm, as suggested by Dr. Roberts.

DR. JOHN B. ROBERTS rejoined that it was quite probable that this operation had been done before. His belief was, however, that it had not been advocated as a routine procedure for all cases in which axillary carcinoma occurred secondary to an operation upon the breast.

In these cases he believed it was good surgery to disarticulate the arm and clean out the axilla, getting far up into its apex.

His conviction was that it was better to amputate the arm and remove the carcinomatous material thoroughly than to be satisfied with letting the patient die. His belief in the operation was so strong that he should certainly try it, and it was only because it seemed to him to be a great mutilation that he did not do it in a recent case. It seemed to him that the operation was reasonable, and founded on good scientific grounds.

EDITORIAL ARTICLES.

TERRIER AND AUVRAY ON FLOATING LIVER (HEPATOPTOSIS) AND ITS SURGICAL TREAT- MENT.¹

THE authors, after describing the ligaments of the liver, falciform, coronary, and triangular, and the gastro-hepatic, hepato-renal, and hepato-colic folds of the peritoneum, refer at length to the function of the inferior vena cava as a support to the liver, which, according to Faure, by its close adherence to the central tendon of the diaphragm, plays an important rôle among the hepatic supports. This observer found that a force of thirty-five to forty kilogrammes is necessary to tear the liver from the diaphragm, when the inferior vena cava is divided a force of twenty kilogrammes suffices for the same purpose. As a result of his experiments he considers that the pressure of the abdominal wall and of the intestines is a feeble support to the liver, sufficient to prevent that organ pulling too heavily on its ligaments, and to a limited extent diminishing the strains and stresses which the liver cannot fail to give its ligaments during sudden movements of the body.

Glenard believes that the intestines are an important support to the liver, the anterior abdominal wall being their *point d'appui*. Descent of the liver he thinks due primarily to a diminution in volume of the intestines, while Landau believes the primary defect to be a distention of the belly wall.

(2) *Pathological Anatomy*.—The pathological anatomy of

¹ Felix Terrier and Maurie Auvray, of Paris, in *Revue de Chirurgie*, August and September, 1897.

floating liver is not well known. Where the mobility of the liver is partial the anatomy is better understood.

During operations "floating lobes" have been found on several occasions, but in these the suspensory apparatus is unaltered and the mass of the liver remains in its usual position. Riedel noticed in 1888 that gall-bladder disease is a cause sufficient to produce "floating lobes" of the liver. This observation has been substantiated.

A useful synonym for "floating liver" is "hepatoptosis." Few observations have been made into the state of the inferior vena cava in cases of total hepatoptosis. Faure noticed in one instance this structure so loose and elongated that it could be moved away from the right side of the spinal column without difficulty. When the liver was moved in various directions the vein easily followed suit, so much so that it was easy to pass the finger around the posterior surface of the vein. Useful observations have been made by Kirmisson and Symanowsky as to the condition of the suspensory apparatus in floating liver. The former reports laxity, the latter elongation of the ligaments. [In 1892 I reported a case of "floating liver," stating that the suspensory ligament was elongated. *International Journal of Surgery*, 1892, p. 332.—J. F. B.]

Péan has seen the vein bent on itself, and the suspensory ligament elongated and very vascular.

H. Delagénère found the same ligament much hypertrophied and apparently œdematous. The coronary ligament was elongated until it looked like a "*meson*."

Many congenital defects in the suspensory apparatus have been described.

The position occupied by the displaced liver varies much, and it is only from lack of examination that very many cases of slight displacement have not been recorded. Most commonly the malposition of the liver has only been found accidentally during exploratory operations or in autopsies.

Demarquay found the liver turned upsidedown, the gall-bladder being next the diaphragm.

Griffiths and Trush found the liver rotated on its transverse axis, the superior surface of the organ being in touch with the anterior wall of the belly, while its anterior border occupied the iliac fossa.

Heisher has seen the convex surface of the liver lying in the right flank while the anterior edge was vertical and the inferior surface was facing to the left. [In my case the same position was observed.—J. F. B.]

Kirmisson found a liver whose original seat was the *left* hypochondrium, dislocated and rotated into the right hypochondrium, where it lay with its posterior border anterior and its gall-bladder posterior.

Perihepatic adhesions have been found.

Concomitant disease has been noticed in the mobile liver itself as well as in other abdominal organs. Trush reports cancer and Lannelongue cirrhosis of the liver.

Often the abdominal wall is altered. It may be flabby, pendant, or even the seat of a true eventration.

Floating kidney, intestinal ptosis, uterine displacements, herniæ and varicoceles are common in cases of hepatoptosis.

(3) *Etiology and Pathogenesis*.—(a) Partial hepatoptosis is common. Sometimes its cause has escaped the clinician, but generally it is a hypertrophic elongation of a part of the liver caused by the dragging of a weighty tumor in a neighboring organ which has become adherent to the liver, or of a diseased gall-bladder (Riedel). Corsets exert a marked effect on the liver.

(b) Complete hepatoptosis is considered by most authors to be more common in women than in men, but Glenard found 25 per cent. of cases in men to 15 per cent. in women. Severe cases are rare but slight ones are common.

The affection may be congenital or acquired. Congenital cases are due to the absence of the coronary and suspensory

ligaments. Most commonly hepatoptosis is acquired, and is due to relaxation of its means of support. Elongation of the ligaments has rarely been noticed, but enteroptosis is common and deprives the liver of the support of the intestines. Malnutrition of the suspensory apparatus or of the viscera (weakening of the abdominal wall, enteroptosis) may be said to produce such a state of affairs that the liver only waits for an excuse to move off from its usual moorings. The determining causes of hepatoptosis are generally mechanical. Among these are repeated strains, heavy work, violent exercise, severe forced expiration, etc. Some authors blame the use of corsets for producing floating liver, but others point out that well-fitting corsets exercise their maximum pressure immediately above the iliac crests, and hence must be adjudged innocent.

The pendulous condition of the belly wall which may follow pregnancy is a fruitful cause of floating liver. Other causes worthy of mention are increase in weight of the liver, atrophy of the connective tissues, uniting that organ to the diaphragm.

(4) *Symptoms and Diagnosis.*—(a) *Partial Mobility of Liver (Floating Lobes).* Generally patients notice a tumor in right side of belly. These tumors are of slow growth. Pain is the dominant symptom, and may be nearly continuous or subject to exacerbations which may last two or three days. It is often severe enough to keep the patient in bed where he assumes and remains in that position in which the pain is least severe. The pain is often accompanied by palpitation, flashes of heat in the head, high fever, indigestion, anorexia, vomiting, etc. The patient becomes thin, weak, and subject to syncope.

Physical examination reveals an enlargement of the abdomen proportionate to the size of the floating lobe. Percussion shows the tumor to be continuous with the liver dulness, which is in its normal location. Palpation shows the limits and site of the tumor as well as its connections. The tumor may be smooth, compact, elastic, without pulsation, bruit, or fremitus. It may

be uneven and lobulated; may follow the movements of respiration, and may be movable transversely and antero-posteriorly. When the "floating lobe" is properly situated and accompanied by certain biliary symptoms, it is of immense value in the diagnosis of gall-bladder disease.

(b) *Complete Hepatoptosis.* When it occurs suddenly, as during a fit of coughing, it gives rise to a feeling of tearing and torsion in the right side. There is acute pain in the belly and chest, difficulty of respiration, nausea, feeling of fulness in the abdomen, and tendency to syncope. The pulse is frequent, weak, and irregular. The patient is in a state of great anxiety. Diagnosis is easy.

When hepatoptosis is slow and progressive the diagnosis is far from being so easy. Generally the patients have suffered for a long time from various functional disturbances. Pain is almost always present. When slight, it consists in a feeling of weight and dragging in the belly or flanks, which is exaggerated on movement. Sometimes the pain is very violent, closely resembling hepatic colic. This resemblance is the more marked because icterus is often present. Jaundice is generally slight. There may be dyspnœa, digestive troubles shown by flatulence and constipation. Palpation, headache, visual troubles, and vertigo are common. The patient cannot attend to his work and is liable to become melancholic. Ascites and œdema have been noticed. Purpura has been seen in one case. There may be genito-urinary troubles,—*e.g.*, frequent micturition, albuminuria, leucorrhœa, and metrorrhagia. None of the functional ailments mentioned are diagnostic; they are common to all visceral ptoses.

Physical examination, especially when certain too long neglected methods are employed, is the only means of arriving at a diagnosis.

Inspection.—Often the belly wall is thin and flaccid. The skin is shrunken and faded. In the erect posture the intestines push the abdominal wall before them and descend in front of the

pubis. In the horizontal posture individual loops of gut may be seen. Separation of the recti muscles from repeated pregnancies may permit of eventration. Thinning of the abdominal wall is *not* always present. There may be prominences of the right flank. Glenard's sign is present, and consists in the fact that the lower part of the umbilicus is hidden by a fold of skin. This is due to traction exercised by the liver on the suspensory ligament.

Palpation and percussion, carried out as usual, give results that might be expected.

(5) *Treatment.*—*A.* Treatment of partial hepatoptosis has been carried out in three ways: (*a*) By resection of the "floating lobe"; (*b*) by fixation to the abdominal wall,—*i.e.*, partial hepatopexy; (*c*) by cholecystotomy, in the hope of indirectly diminishing the lobe.

(*a*) Resection of the lobe was practised by Langenbuch in 1887. He applied a chain of ligatures to the pedicle and cut away the lobe. The same evening hæmorrhage called for a second operation, in which he was successful, and the patient recovered.

In 1895 Bastianelli used an elastic ligature and the thermocautery. Recovery.

(*b*) Partial hepatopexy. First performed by Billroth in 1884.

The most rational site for the abdominal incision is over the most prominent part of the tumor. Several sutures are passed through the "floating lobe," and cautiously fixed to the abdominal wall in such a manner as to secure apposition of the organ to the parietal peritoneum. The operation is easy and successful.

(*c*) Cholecystotomy is used in those cases dependent on the existence of lesions of the gall-bladder. This operation has given excellent results.

B. Treatment of complete hepatoptosis may be medical or surgical.

The former ought always to be tried at first. Disorders of nutrition play an important rôle in the pathogenesis of the trouble, and therefore call for treatment. A course of tonics and hydrotherapy is advisable. This will only be of use in the mild cases, which are unfortunately rarely diagnosed.

The use of electricity has been advised to increase the tone of the abdominal muscles. In one case this is reported to have been of value. As an *adjuvant* its employment is advisable.

Special bandages and binders have frequently been employed to sustain the displaced organ. Those fitted with a pad to support the liver directly are the best, but unfortunately all such contrivances are liable to be uncomfortable and the patient discards them.

When treatment, such as has been outlined, fails, one may advise, in a small number of cases, recourse to surgical intervention.

The operation of complete hepatopepy was first performed by Gérard Marchant in 1891. Up to the present the operation has been carried out fifteen times.

The Operation.—The abdominal incision employed has been various. Some use a vertical incision along the external border of the rectus muscle, some use it in the middle line, while others have recourse to a cut parallel to the costal arch. Probably the vertical median incision is the best, since it permits exploration of all the structures in the neighborhood. If in the course of the operation a transverse incision appears needed it can easily be made.

The liver is generally found to be very movable, and the first care of the surgeon must be to return it to its normal position. This is generally easy. Once reduced it must be held in position by an assistant until all the sutures are fixed in place. Sometimes the liver has been found adherent in its faulty position. These adhesions must, of course, be divided before any further steps are possible.

Fixation of the liver is attained by suturing it to the right costal margin or the abdominal wall. The sutures are passed through the parenchyma of the liver. Coarse catgut or preferably thick silk are the materials used. The stitches must be thick to avoid cutting the friable organ. The number of stitches used has varied from two to eight. The number employed must be sufficient to sustain the weight of the organ. If the stitches are numerous, then each will have less strain upon it and be less liable to cut the parenchyma.

In the operation it may be better to use blunt needles in piercing the liver, but in the author's experiments no harm came from the employment of sharp ones. The sutures ought to be parallel to each other and at intervals of two to three centimetres. In applying the sutures to the costal cartilages the pleura has sometimes been injured, but no harm has resulted. When the sutures pass through the abdominal wall they must be tied and buried under the skin. Lucas-Champonnière modifies the operation by passing some of the threads through the suspensory ligament. To assure the formation of adhesions it is well to scarify or irritate the surfaces to be approximated.

If it is impossible to reduce the liver, it may be advisable to fix it wherever possible, and so obtain relief from distressing symptoms.

In treating complete hepatoptosis Depage considers hepatopexy of secondary importance to *laparctomy*. To do away with the laxity of the belly wall, and so gain support to the abdominal organs from that structure, he excises portions of the wall transversely and vertically.

Péan in 1896 described an operation which he performed in a case where the liver was displaced into the pelvis. The abdominal incision was transverse and low down (the diagnosis before operation was floating kidney). Owing to difficulties arising from the weight of the organ and from parenchymatous bleeding he considered the ordinary operative methods inadvisable. A

successful attempt was made to form a serous partition between the liver and the rest of the peritoneal cavity. This was accomplished by separating a flap from the anterior abdominal wall above the transverse wound and turning it back below the liver, suturing it to the peritoneum of the posterior abdominal wall. This procedure was simplified, because in its descent to the pelvis the liver had pushed the ascending and transverse colon to the left, and thus much more room was available for manipulations in the right side of the peritoneal cavity.

Results of complete hepatopexy (*alone*): Eleven cases,—eight recoveries, one death, two cases uncertain. The only death was due to acute peritonitis.

In eight cases the condition of the patient was rendered very satisfactory and maintained in this state.

Depage's statistics consist of three cases. (Depage performs laparectomy as well as hepatopexy.)

Of these three cases, two recovered and one died. In the fatal case complications were such that choledochotomy and cholecystectomy were necessary. The patient died of shock. In the two cases labelled recovered the results were excellent, the patients being able to attend to their occupations without any suffering.

In concluding their paper Terrier and Auvray state that they believe the method of Depage to be the best, since he both fixes the liver in its normal location and by operating on the belly wall prevents ptosis of the intestines. Laxity of the abdominal wall being a mechanical state favoring both hepatic and intestinal ptosis, anything which will do away with this laxity must be of great moment in the surgical treatment of these conditions.

JOHN F. BINNIE.

INDEX TO SURGICAL PROGRESS.

CHEST.

I. Pistol-Shot Wound of the Pulmonary Artery and Aorta. By DR. GEORG PERTHES (Leipzig). The following case was under observation in the Leipzig Clinic for ten months after the receipt of the injury.

Man, twenty-six years old, attempted suicide by shooting himself with a revolver carrying a ball of eight millimetres calibre. Brought into the hospital three hours later: face pale, lips cyanosed, pulse 110, small, regular; temperature 97.5° F.; respiration 42, dyspnœa and slightly bloody expectoration. Examination showed that the bullet had entered in the second left intercostal space, three centimetres to the left of the sternum. There was visible pulsation around the opening; but while the intercostal space was rendered prominent at every heart-beat, there was a simultaneous retraction in the fourth and fifth spaces. Distinct thrill over area of pulsation. Anteriorly, below the wound, absolute dulness. Over entire left anterior chest loud blowing murmur, most intense over the wound, not confined to the systole or diastole, transmitted to the carotids, especially on the left side. Patient recovered rapidly; dyspnœa disappeared; pulse-rate continued high; but the heart action remained regular.

Diagnosis of an injury to the large intrathoracic blood-vessels was established by (1) the direction of the wound; (2) the location of the ball in the sixth dorsal vertebra, as shown distinctly by a radiograph picture; (3) the heaving pulsation in the second intercostal space; (4) the blowing murmur heard loudest in the immediate vicinity of the wound.

In the after-history, a prominent place was taken by the

lighting up of an old left empyema, the patient at the time of the shooting having a discharging fistula as the result of an Estlander's operation (resection of the eighth rib in the scapular line). Two months after entrance, Estlander-Schede's operation with resection of third and eighth ribs under chloroform anæsthesia. Good recovery,—patient up out of bed in several months. Died ten months from the time of suicidal attempt after four days' illness.

Autopsy showed that the left lung was retracted from the old empyema, and thus left the vessels uncovered; the bullet had opened the left pulmonary artery on its upper aspect, and had then perforated the anterior and posterior wall of the descending thoracic aorta, finally lodging in front of the transverse process of the sixth dorsal vertebra. A free communication existed between the two vessels forming an aneurism of a diameter of two centimetres. Immediate and fatal hæmorrhage had not taken place, owing to the thickness of the adhesions surrounding the vessels, and the blood flowing from the aorta had found a natural channel for escape in the pulmonary artery. Death was due to acute œdema of the lungs, bits of thrombi having apparently become dislodged from the aneurism.

The author has collected twelve cases of lesions of the aorta which were not followed by immediate death.—*Beiträge zur klinische Chirurgie*, Band xix, Heft 2.

C. L. GIBSON (New York).

FEMALE GENITO-URINARY ORGANS.

I. Remote Results of Removal of Both Ovaries. By B. S. DUNN, M.D. (Los Angeles, Cal.). In careful observations made upon 100 cases operated upon in the Broca and St. Louis Hospitals, in Paris, Dunn found that where the women had prematurely lost both ovaries 78 per cent. subsequently suffered a notable loss of memory; 60 per cent. were troubled with flashes

of heat and vertigo; 50 per cent. confessed to a change in their character, having become more irritable, less patient, and some of them so changed as to give way to violent and irresponsible fits of temper; 42 per cent. suffered more or less from mental depression, and 10 per cent. were so depressed as to verge upon melancholia. In 75 per cent. there was a diminution in sexual desire and some of these claimed they experienced no sexual pleasure; 13 per cent. were not relieved of the pain from which they suffered; 35 per cent. increased in weight and some became abnormally fat. Some complained of a diminution in the power of vision; 12 per cent. noted a change in the tone of their voice to a heavier, more masculine quality. Some 15 per cent. suffered from irregular attacks of minor skin affection; 25 per cent. had severe headaches, as a rule, increased in intensity at the menstrual period. Equally as many complained of nightmare, more or less constant, while about 5 per cent. suffered from insomnia. In a few cases there existed a sexual hyperexcitability not present prior to the castration.

He particularly noted a few cases presenting gastric reflexes where, without any premonitory symptoms or apparent cause, the stomach would reject food or refuse to prepare it for intestinal digestion, and the consequent distress following the fermentation compelled the patient to seek relief. It should be noted that usually these troubles were more marked in women under thirty or thirty-five years of age.—*American Journal of Surgery and Gynecology*, September, 1887.

CORRESPONDENCE.

CAROTID EXCISION FOR MALIGNANT GROWTHS.

To the Editor of ANNALS OF SURGERY:

DEAR SIR,—My attention has been called to a report of a meeting of the New York Surgical Society, appearing in the September issue of the ANNALS, in which I am quoted as saying several things of a somewhat surprising nature. Among other items, I am made to describe the external carotid artery as a vessel “an inch and a half long, without branches.”

This, at least, has the merit of being unconventional anatomy, and as such is not devoid of interest.

After the meeting in question the reporter of the society explained that he was ill,—he has since had to go away for his health,—and that his stenographic notes of what I had said were poor. He asked me to correct his proofs carefully. This I did; but for some reason the editor did not receive these amendments.

So much in explanation. I would merely add that the subject I then discussed—my new operation (some two years old) of complete *excision* of the external carotids from end to end, and done upon both sides of the neck—remains of keen interest as a hopeful and apparently safe means of starving malignant growths fed by these arteries, and which otherwise must kill the patient.

The results are markedly different from and better than those following mere ligation of these arteries; in which latter case a free anastomosis is almost sure to be established at an early date, whereupon the tumor proceeds to grow as before.

It is too early for a definite statement as to percentage of real cures by the arterial excision plan; but I can report eleven instances (counting both sides, for they are individual and grave

operations and should always be done at different sittings) performed by myself, and two more by Dr. Da Costa, of Philadelphia, without a single death resulting from the operation. It would seem, therefore, to be quite a safe procedure. And Dr. Da Costa, in reporting his operations to me, as he kindly did recently, comments upon the fact that it is more easily done than he had anticipated.

All of these cases will be reported in detail in the *ANNALS* before long. Meanwhile I would bespeak for this idea a trial at the hands of other surgeons.

Just a few words as to technique. After tying and dividing the external carotid at its origin, also tying and dividing every branch as it is reached, from below upward, we come to the point where the external carotid passes up into the parotid gland.

Now we must carefully avoid the knife, to prevent facial paralysis. Here we should *stretch* our way into the gland with dressing-forceps, meanwhile maintaining as firm a downward traction upon the carotid as seems safe. At length the bifurcation into the temporal and the internal maxillary is reached; whereupon a single ligature is slipped up over their common origin, and is tightened upon both, by aid of two pairs of slender-nosed dressing-forceps. Then the external carotid is divided just beneath these terminal vessels.

In one instance, in which Dr. Joseph D. Bryant was present to see the operation, I pulled a trifle too hard, and the carotid broke high in the parotid gland and close to the bifurcation of the artery. No bleeding followed this mischance, and the case did well in all regards.

Respectfully,

ROBERT H. M. DAWBARN.

A STUDY OF THE CASES OF DISEASE OF THE
FEMALE GENERATIVE ORGANS PERSON-
ALLY TREATED DURING TEN YEARS' WORK
IN THE METHODIST EPISCOPAL HOSPITAL
IN BROOKLYN.

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IN organizing the work of the Methodist Episcopal Hospital in Brooklyn the diseases of the female generative organs have not been set apart from other surgical affections as a distinct class, to be placed in the charge of a surgeon who should limit himself to the care of this special class of affections, but have been cared for by the surgeons who have been intrusted with the general surgical work of the institution. In this respect the organization has been in accord with the generally accepted facts of present knowledge that these affections are in a very large proportion of cases surgical in their nature and best treated by operative measures, and that their diagnosis and treatment are dependent upon the same principles and methods which are employed by surgeons in dealing with the affections of other parts of the body.

The present report presents the experience accumulated and the results from treatment obtained in this class of cases in a single service of the hospital, and includes about one-half of all such cases treated in the institution from the day of its opening to October 31, 1897,—nearly ten years. They have been cared for in the general ward devoted to the reception of women, with the exception of some who have oc-

cupied private rooms, and the operative work required for them has been conducted in the general operating-room of the hospital.

The reporter, in undertaking the care of these cases, found freely open to him, in his desire to secure additional special training to fit him for the better performance of his work, many opportunities of observing the work of eminent surgeons, both at home and abroad; and in this connection it is fitting that he should especially acknowledge gratefully the courtesies extended to him by Drs. Wylie, Kelly, and Marcy in this country, by the late Thomas Keith of Edinburgh, Lawson Tait of Birmingham, Max Schede of Hamburg, August Martin of Berlin, and Jules Péan of Paris, from the operating-rooms of each of whom he brought away much of value that he has been able to weave into the work that is detailed in the following pages. Special mention should also be made of the valuable assistance rendered to him by Dr. W. Gill Wylie, of New York, who during the year 1889 and 1890 occupied the position of consulting gynæcologist to the hospital. During the period from 1887 to 1892 his assistant surgeon, Dr. John Bion Bogart, and from 1892 to 1897, Dr. James P. Warbasse, contributed much to secure the best results. The intelligent and zealous co-operation of a succession of able house-surgeons, and the faithful ministrations of a most capable body of nurses, should also not be omitted from grateful mention in this connection.

Classification.—The grouping of the cases according to a systematic method is attended with much difficulty, since a very large proportion of them have been composite in character, presenting lacerations, inflammations, and displacements in every variety and degree and combination. By selecting, however, the most urgent condition in each case as the basis of classification a fairly good clinical division for the purposes of study has been possible, and will be followed in this report. This division is primarily by regions into (I)

vulva and perineum; (II) vagina; (III) uterus; (IV) Fallopian tubes; (V) ovaries and broad ligaments.

I. VULVA AND PERINEUM.

The Vulva.—Cases in which the vulva has been the chief seat of disease have been few; one case each of contused wound of the vulva (kick), of tubercular ulcer (patient suffering also from pulmonary tuberculosis), of acute vulvitis (gonorrhœal), and of chronic inflammation of the gland of Bartholin, has presented itself. Of more importance and surgical interest have been two cases of *carcinoma of the vulva*.

The first case, a woman, sixty years of age, was admitted with an indurated nodule, about the size of a pheasant's egg, in the right labium majus, with the history that a similar growth had been cut out from that locality six months before, after it had been gradually forming for more than a year. A wide extirpation of the recurrent growth was done, after which for three and a half years the parts remained healthy. Then a recurrence of the disease was discovered, but was neglected until eighteen months later, by which time it had widely extended, infiltrating the wall of the vagina, the perineum, and the buttocks, when she presented herself again to me clamoring for relief. No hope of further help could be held out to her, and she disappeared. It is possible, though not probable, that she may have survived for six months longer; in that case the course of the final recurrence from its start to its fatal termination was about two years. There was likewise a period of two years of development, interrupted by the first operation, before she came under the care of this hospital; then a period of three and a half years of entire freedom from discernible disease, before the final recurrence. Thus the total length of time from its first appearance until death was seven and a half years. Allowing three years for the natural course of the disease, unchecked by surgical means, it is evident that four and a half years of life were given to this woman by the means adopted, and there is every reason to believe that, had earlier and wider extirpation been done in the first instance, the second operation would never have been called

for, or that had immediate application for relief been made as soon as the second recurrence was discovered, another prolonged, possibly permanent, period of freedom from the disease might have been secured.

The second case, a woman, fifty-six years of age, presented herself, saying that six months before she had first become aware of a lump in the left labium minus. This had gradually increased and extended until the labia on both sides, and the connecting fourchette had become involved. The condition is shown in Fig. 1, from a photograph taken before operation.

A wide extirpation was done; uncomplicated healing followed; and for more than two years thereafter the parts remained free from perceptible disease; then a small suspicious



FIG. 1.—Epithelioma vulvæ, from a photograph.

nodule was detected by me in the cicatrix on the right side of the introitus; but although immediate extirpation was urged, she deferred submitting to it for a whole year, by which time the nodule had degenerated into a deep ulcerating cavity, of irregular outline, with a surrounding zone of infiltrated tissue, extending upward into the vagina and outward into the perineum, but not involving the rectum. A wide extirpation of the disease was again done, involving the removal of much tissue, and the resort to plastic work to cover in the defect left. The convalescence was complicated by an attack of erysipelas, which remained limited to the pudenda, buttocks, and thighs, and was soon recovered from. After two more years of health, this pa-

tient has now again presented herself, still free from disease in the original site of attack, but now with extensive involvement of the inguinal and retroperitoneal pelvic glands, forming a large sloughing tumor in the right inguinal and suprapubic regions. This is now plainly inoperable, and no further attempt at removal is to be made. But a few months' prolongation of life can be expected. Granting that this period may amount to six months, the length of time from the first detection of her disease until its termination in death will have been six years,—that is to say, an addition of three years to her life has been effected by the operative work done.

The Perineum.—Every conceivable degree of injury to the pelvic floor and of complicating displacement and inflammatory disturbance of the uterus and appendages is represented among the cases in which operation for repair of the perineum has been performed. The complexity of the disorders which are associated with, or spring from, perineal injuries is well illustrated in this series of cases. Of the total number of cases (eighty-five), in but a single instance was the perineal injury the sole condition requiring attention; *endometritis* was the most common associated condition, being sufficient in degree to require curettage in all but ten of the cases. *Laceration of the cervix uteri* was nearly as constant a complication, being sufficient in degree to require trachelorrhaphy in sixty-three cases; in six of these cases an amputation of more or less of the cervix was also done on account of the hyperplasia present. *Eversion of the anterior wall of the vagina*, sufficient to require plastic retrenchment for its control, was present in sixteen cases, in all of which a liberal portion of the anterior wall was excised and the defect closed by drawing over it the tissues from either side of the canal. Some degree of *prolapse of the uterus* is common to all cases of loss of perineal support, being the chief element in causing the sensations of bearing down and weakness, which attend that condition, although to complicating inflammatory conditions is usually due the greater share of the

pain and actual disability which patients with prolapse present. It has been very notable that the lesser degrees of prolapse have been attended by much more troublesome sensations of backache, dragging or bearing down, with other ill-defined pelvic and lumbar discomfort, incapacitating the sufferer from attending to ordinary labor and limiting much her pleasures, than the greater degrees in which the relaxation of the uterine supports has been so great as to permit the cervix to present at the introitus or to protrude as a tumor between the thighs. In the latter class of cases the chief disability has been the mechanical one from the inconvenient protruding mass, and the difficulty of keeping adjusted an efficient support. The explanation is doubtless that in the greater degrees of displacement the relaxed and overstretched tissues have ceased to be sensitive through the degeneration of all their component parts,—nervous, muscular, and fibrous.

In five of the cases of this series, the uterus protruded from between the vulva, as an external tumor; in eight others it habitually presented at the introitus; in twenty-four others it descended in the axis of the vagina to a notable degree; in the rest of the series the amount of prolapse apparent, on examination, was not sufficient to cause any note of it to be made in the records. The means adopted for the renewed support of the uterus, other than the restoration of the perineum, will be described in a later section.

Posterior displacement constituted a complication requiring special interference for its relief in twenty of these cases. The backward rotation of the axis of the uterus as the organ descends in the various degrees of prolapse is not taken into consideration in this enumeration of cases of posterior displacement; but only those in which there was in addition a more or less acute backward flexion of the organ. In six of these cases the uterus was fixed in anterior position by shortening the round ligaments after the method of Alexander; in the remaining instances suture of the fundus to the anterior abdominal wall was done.

Hæmorrhoids were present to a notable degree in only three of the entire series. The hæmorrhoidal masses were in each instance isolated, ligated, and cut away.

The combined operations required were, with but very few exceptions, all done at one sitting. The operations combined with the perineorrhaphy were as follows: anterior colporrhaphy alone, 6; anterior colporrhaphy and Alexander's operation, 1; anterior colporrhaphy, narrowing of vagina by a series of purse-string sutures, and hysteropexy, 1; anterior colporrhaphy and curettage of the endometrium, 1; anterior colporrhaphy, curettage of the endometrium, and amputation of the cervix, 2; anterior colporrhaphy, curettage of the endometrium, amputation of the cervix, and hysteropexy, 1; anterior colporrhaphy, curettage, trachelorrhaphy, and hysteropexy, 4; curettage of endometrium only, 6; curettage and Alexander's operation, 1; curettage, partial excision of the ovaries, and hysteropexy, 1; curettage and hysteropexy, 1; curettage and trachelorrhaphy, 36; curettage, trachelorrhaphy, and ligation of hæmorrhoids, 3; curettage, trachelorrhaphy, and Alexander's operation, 2; curettage, trachelorrhaphy, and hysteropexy, 10; curettage, trachelorrhaphy, hysteropexy, and partial or complete removal of the appendages, 3; curettage, amputation of cervix, and hysteropexy, 2; Alexander's operation only, 2.

The results, both immediate and remote, secured by these attempts to repair the pelvic floor, have been, as a rule, highly satisfactory, the instances in which the plastic attempt has failed having been very rare. All cases that presented themselves for relief have been operated upon, except in the case of one old lady, sixty-eight years of age, who was also suffering from lymph-œdema of the legs. Seven other women, who were over sixty years of age, were operated upon; six between fifty and sixty years of age; sixteen between forty and fifty; thirty-four between thirty and forty, and twenty-one between twenty and thirty.

In twenty-three cases of the series the abdomen was also

opened to correct complications. All the cases recovered, nor was there cause for any apprehension as to life in any case.

In one case complete failure of the operation was due to *hæmophilia*.

The patient, an apparently healthy young married woman, twenty-nine years of age, had borne her first child eighteen months previously. In the early stages of her labor such profuse bleeding developed that rapid instrumental delivery was deemed necessary, in the course of which a deep bilateral laceration of the cervix and a tear of the perineum completely through the sphincters into the rectum were sustained. Excessive and prolonged bleeding followed this delivery, but was finally checked. Two months later the patient was operated upon for the repair of the lacerations, but renewed hæmorrhage and septic infection made the effort a complete failure. At the end of eighteen months she entered the Methodist Episcopal Hospital, desiring that another attempt should be made. The presence of any peculiar tendency to bleed was not recognized, and the operation was proceeded with as usual. From the surfaces exposed by the incisions a general bloody oozing at once set in, and persisted despite the prolonged pressure of hot water compresses. A firm tamponade of iodoform gauze, supported by a T-bandage, was then applied. After twenty-four hours, when this was removed, renewed bleeding necessitated its replacement; again, forty-eight hours later, the renewal of the tampon was necessary to control the bleeding. From this time all hope of securing repair of the perineum by suturing was abandoned; and the tamponade was continued for several days longer, until the open vessels had become closed by the advancing granulating process, while by stimulants and careful diet her strength was maintained until final cicatrization of the wound was secured. The patient was discharged unimproved. It was afterwards learned that both the mother and the grandmother of this woman were bleeders.

In three other cases the result was imperfect, owing to infection and breaking down of the perineal wound: one case

by fæcal infection, the laceration having involved the rectum; one case, an old woman, sixty-three years of age, who had a chronic bronchitis, in which, during frequent attacks of coughing, the contents of the bladder would be involuntarily expelled over the wound many times daily, and one case, an old woman of sixty-six years of age, whose tissues exhibited such feeble reparative power that the sutures quickly cut through the soft and flabby tissues, leaving the vulvar orifice gaping as before.

The operative technique has been modified in its details in different cases as seemed best adapted to secure in each case a broad surface of coaptation, the drawing together of retracted tissue, the removal of redundant tissue, and the reconstruction of the normal musculo-fibrous body of the perineum. Shaving and thorough scrubbing of the parts is first done; the vagina is scrubbed and disinfected with care; whatever attention is required by the uterus is then done, curettage and trachelorrhaphy being called for in the majority of instances; then the tissue at the vulvo-perineal junction is put upon the stretch by traction with tenacula, one being hooked into the base of the labium minus on each side; the tissue thus held is then pierced by a bistoury, which is made to cut its way outward in either direction to the tenacula; thus in an instant the subcutaneous tissue is freely opened by a long transverse wound, one edge of which is continuous with the vaginal mucosa, the other with the skin of the perineum, or, in a case of complete rupture through the sphincter, with the rectal mucosa. The further steps are facilitated by now applying to the edge of each of these flaps two catch-forceps by means of which they are retracted from each other, and are steadied or held as required. In the case of incomplete rupture and relaxation of perineum, constituting the vast majority of the cases operated upon, a dissection is now made upward beneath the vaginal mucosa to a distance of an inch or more, the greater the redundancy and tendency to eversion of the floor of the vagina the higher up the dissec-

tion is carried. The simple precaution to keep the knife within the plane of the vaginal submucous connective tissue being sufficient to guard against injury to the wall of the rectum; at the same time the dissection is extended laterally towards the ischial rami sufficiently to fully expose the muscular and fascial elements that may have retracted beneath the lateral sulci, and to insure that when these shall be drawn together by suture the continuity of the normal supports of the pelvic outlet shall be restored. In the later stages of this dissection venous sinuses are frequently opened that require the temporary application of hæmostats to control bleeding, the later pressure of the sutures generally suffices to close them, so that the application of ligatures is rarely necessary. A wedge may now be cut out of the vaginal flap, its size being governed by the evident redundancy of the vaginal floor when the lateral surfaces of the operation wound are brought together. If such retrenchment of the vaginal mucous membrane is made, the cut edges of the mucosa are then first sutured together by ordinary catgut, beginning at the apex above and working down to the introitus; the tissues of the perineum proper are next brought together by a series of three or more sutures of chronicized gut that are passed deeply into the retracted tissues that have been exposed in the extreme lateral depths of the operation wound, so that when tied they bring these tissues again into apposition in the midline and reconstitute the perineal body. The ends of these deep sutures are cut off short and become buried by the closure of the superficial wound. The superficial perineal sutures are then introduced, beginning at the point nearest the anus and advancing upward until they meet the line of vaginal suturing first made. Silk is the material always used for these external sutures. They penetrate the skin and all of the subjacent wound margin down to the level of the deep sutures. They are the only sutures that require subsequent attention, being removed, as a rule, on the twelfth or fourteenth day thereafter. The suturing having been com-

pleted, the parts are well dusted with powdered oxide of zinc and an absorbent protective compress applied. The bowels are moved on the third day. The bladder is emptied by catheter three times daily until the fifth day, from which time spontaneous urination is allowed. The patient remains in bed until the twenty-first day.

When the laceration extends through the sphincters, the operation is conducted upon the same general lines, the incisions being prolonged downward on either side so as to expose the retracted ends of the sphincters. When the recto-vaginal septum is involved a separate line of sutures is also applied to the rectal mucosa.

As illustrating the wide diffusion of the clientelage of this institution, the residences of these eighty-five patients is of interest. Forty, or less than one-half, were residents of Brooklyn; twenty-three came from various portions of the State of New York, outside the city of Brooklyn; from Pennsylvania, eight; New Jersey, eight; Connecticut, two; and Florida, West Virginia, and Nova Scotia, each one.

II. VAGINA.

The number of cases in which the condition of the vagina has been such as to be deemed worthy of special note has been very small. The frequent conditions of eversion, cystocele, and rectocele, due to perineal laceration or relaxation, have been sufficiently mentioned in the previous section. Naturally the various grades of vaginitis, unless accompanied by serious disturbances of the endometrium and Fallopian tubes, do not often produce conditions calling for hospital treatment. When the more serious conditions mentioned are present, the disturbance of the vaginal mucosa is relatively insignificant, and finds its relief through the means used for the cure of the other conditions. Thus it is, therefore, that three cases only are recorded in which an *acute vaginitis* was the most important lesion present. These were in the persons of respectable married

women, aged forty-three, forty-nine, and fifty years respectively, to whom infection had been apparently conveyed by unfaithful husbands. In the case of only one of these was search made for the specific micro-organism, and in that one the diplococcus of Neisser was abundant in the discharges. One was complicated by abscess of both vulvo-vaginal glands. In all the endometrium was also involved. The measures depended upon for treatment were rest in bed, with copious douching of the vagina with dilute solutions of sulphate of zinc, followed by placing in the vagina a strip of gauze saturated with oxide of zinc cream to separate the inflamed surfaces and facilitate drainage. To the endometrium applications of a mixture of carbolic acid and iodine were made.

A cyst of the anterior vaginal wall, which had suppurated, was cured by incision, curetting, and packing with iodoform gauze. It had apparently originated in a urethral follicle; there was a history of five years' duration of the trouble, with discharge through the urethra upon several occasions. When admitted to the hospital it formed a tense, tender, egg-sized tumor projecting into the vagina from its roof; its contents could not be expressed into the urethra; a sound passed readily along the urethra into the bladder. After being incised from the vaginal aspect and treated as above mentioned, it rapidly contracted and its cavity became obliterated. The patient was a married woman, thirty-one years of age.

Stricture of the vagina, due to a narrow cicatricial coarctation, midway between the introitus and the uterus, was found to be present in the case of a woman, thirty years of age, who was admitted for treatment of a chronic endometritis. No satisfactory history could be elicited, but it was evident that an antecedent ulcerative vaginitis had existed, and that the vaginal stricture and the endometritis were legacies left by it. The stricture was freely divided and the parts kept distended with antiseptic tampons, until cicatrization of the wound was accomplished.

Papillomata of the Vagina.—A young married woman, twenty-two years of age, who was five months advanced in a third pregnancy, presented herself with the symptoms of an acute vaginitis of some weeks' duration. Examination revealed the mucous membrane of the vagina to be thickly dotted over its whole extent with warty excrescences of varying sizes, bathed in a copious, brownish, muco-purulent secretion. The woman was unwilling to submit to the operative removal of the growths, and, after ten days of treatment with astringent antiseptic douches, returned to her home.

I am permitted to refer, in this connection, to a case of vaginal papilloma treated in the pædiatric service of the hospital, under the care of Dr. J. Bion Bogart, which I saw in consultation with him.

The patient was an otherwise healthy girl, but three years of age, in whom, about three months previous to admission, a cauliflower-like growth had been first noticed protruding from the vagina. It had never given rise to any inconvenience, excepting a constant, irritative, watery discharge. On admission the tumor protruded about three-fourths of an inch from the vulvar orifice, and measured about an inch and a half by three-quarters of an inch. Its exposed surface had been eroded by contact with her clothing, and exuded a watery discharge, which excoriated the neighboring skin. On exploring the vagina under chloroform multiple papillomata were found to spring from its entire surface, the normal capacity having been greatly augmented by the distention occasioned by the enormous development of the growths, which consisted of several masses as large as a walnut, besides innumerable smaller ones so disposed as to necessitate the removal of practically the whole vagina for their complete extirpation. The case was therefore deemed inoperable, and the perineum, which had been divided to facilitate inspection of the vagina, was restored with silkworm-gut sutures, and the patient was discharged unimproved. She subsequently died after an unsuccessful attempt to remove the growths by another surgeon.

Primary Carcinoma of the Vagina.—In one instance this

rare condition presented itself. The patient was a woman twenty-six years of age; the anterior wall of the vagina was the seat of a ragged, ulcerating, infiltrating growth that extended from the introitus half way to the uterus, and nearly encircled the canal. Its removal would have necessitated the taking away of the floor of the bladder and more or less of the recto-vaginal septum. The turning of the ureters into the rectum, and the obliteration of the communication between the rectum and the remnants of the bladder might have been problems for later consideration. The patient, however, refused operation, and returned to her home, where some months later she died from the unchecked advance of the disease.

Uretero-vaginal fistula remained in the case of a woman, forty-nine years of age, in whom the right ureter had been injured during the removal of a myomatous uterus. The case will be described more fully in connection with the cases of myoma. It is sufficient here to say that after three months there began to occur at short intervals crises of obstruction to the flow of urine, due to cicatricial contraction about the outlet of the ureter into the vaginal cicatrix. The ureter and the pelvis of the kidney would become distended with the retained urine, great pain would be experienced, until the pressure would become great enough to overcome the obstruction, when, with the gushing of the urine again escaping into the vagina, relief would be experienced. The other kidney being healthy, the one supplying the injured ureter was removed, the removal being followed by rapid restoration to health of the patient.

No case of *vesico-vaginal fistula* has presented itself during this period.

Double Vagina.—A woman, twenty-nine years of age, who was admitted for the treatment of a tubo-ovarian abscess, was found, on examination, to have a double vagina. The median septum was complete, extending from the vulvo-vaginal junction to the uterus; each canal was roomy and

distensible, and led up to an individual cervix and os. An endometritis existed, for which the two cervical canals were dilated in turn, revealing two uterine cavities, which were each curetted. During the irrigation of the uterine cavities it became apparent that the septum dividing them was incomplete, for the irrigating fluid passed freely from one cavity to the other. When the uterus was exposed in the course of the section for the relief of the tubo-ovarian condition, the body of the organ was abnormally broad, but showed no external marks of fission. The vaginal septum was excised.

III. UTERUS.

Metritis and *endometritis*, in a notable degree, have been present in a very large proportion of the entire number of cases under consideration (175 out of 395, or 44 per cent.), especially with the cases of laceration of the cervix, of ante-flexion and retroflexion, the myomata, and the inflammations of the tubes and ovaries. In these cases the treatment of the uterine condition has been a minor incident in the measures adopted for the relief of the entire disease-complex. In forty-three cases, however, the uterine disturbance has been uncomplicated by any of the conditions named. The most of these women (thirty-two) were multiparous women, between the ages of thirty and fifty, and it has been possible to trace a clear causal relation between accidents of childbirth and the uterine inflammation in many instances, this having been reasonably clear in eighteen instances of the remaining cases. In a small number of instances the infection had been apparently gonorrhœal, only four cases presenting presumptive evidence of such origin. A much larger proportion of cases, however, due to this cause, will be found complicated with disease of the appendages. In four instances an endometritis had supervened upon the occurrence of the menopause. In the remaining cases (fifteen) the causes were not clear.

The relation of *bacterial activity* to persistent endometritis was the occasion of special investigation, which was carried out by Dr. Warbasse, as follows: After the careful routine scrubbing and disinfection of the vagina and cervix, as employed in preparation for all operations on the uterus, while the uterine canal was dilated by the separated branches of a metal dilator, a metallic tube, whose entering end was occluded by a smooth plug, was passed through the open canal to the fundus of the uterus. The plug was then withdrawn, and a delicate, sharp curette was introduced through the tube to the fundus, and made to scrape away a bit of the mucosa of that region. This bit of tissue, with whatever of blood and mucus that came away with it, was then introduced into a tube of warm beef-bouillon gelatin, which, after having been slightly agitated to distribute the material, was either poured into a Petrie dish or made into an Esmarch roll. All of the instruments and apparatus used in these procedures were previously sterilized by boiling. This procedure was carefully carried out in seventeen cases of chronic endometritis. Twelve of the plates gave no growth. Of the remaining five, one showed pure culture of staphylococcus pyogenes aureus in very large numbers; a second showed staphylococcus pyogenes aureus and an organism somewhat resembling proteus vulgaris; a third showed bacteria uræ; a fourth showed pure cultures of staphylococcus pyogenes albus; and a fifth showed the same germ as the fourth. In no case was there a growth from the shreds or pieces of mucous membrane which lay embedded in the gelatin. In the cases in which there was a growth of bacterial colonies in the culture medium, the growth never showed any especial relation or connection to the implanted uterine tissue.

The failure of these tests to show any infection in the tissue proper, and the large preponderance of cases (71 per cent. of all) in which the fluids gave no growth, suggest the inference that, in most, if not all, of the few cases in which bacteria were found, their presence was temporary, and due to some recent accidental contamination, for all of them had

been within a short time previously subjected to repeated examinations and manipulations, during which it is quite possible that a uterine sound may have carried upward into the canal organisms from the external os or vagina, or that the preliminary scrubbing and disinfection, done at the time of the test in question, may have still left at the external os organisms that were carried up into the canal by the dilating instrument or the endoscopic tube.

These observations, as to the absence of bacterial activity in a large proportion of the cases of chronic endometritis, do not conflict with the fact that these cases, in their acute onset, were primarily due to bacterial infection. With the lapse of time the bacteria have disappeared; in many, perhaps most, instances in which such infection has occurred, full recovery of health in the affected organ follows in due time; but there is a remnant in which, from various causes, poor general health, overwork, coincident injuries, and displacements entailing continued vascular engorgement, etc., the primary acute disturbance degenerates into a persistent chronic condition. These are the cases which are met with most frequently in hospital experience. A recognition of the absence of bacterial activity as the cause of endometritis at once points out the lack of value in the local application of strong germicides in the treatment of the condition, while it emphasizes the importance of correcting all the departures from the normal standard that may be discoverable in either the local or general condition of the patient.

The *treatment* available for these cases could in but few instances accomplish the absolute cure of the condition during residence in the hospital. Many had already been under treatment more or less intelligent and continuous for long periods of time, some for many years; in some the constitutional condition, or the necessities of exposure and labor after leaving the hospital were such as to arrest further improvement after their few weeks' residence in the institution, or to provoke a renewal of the disease in as marked a degree as before. Nevertheless, a very marked improvement was

secured in the great majority of cases; all were requested to return after some months for examination, or to report by letter their condition, and in many instances knowledge of the after-progress of the cases was thus obtained; and definite cure is known to have been secured in a large number of cases; the most rapid and favorable response to treatment was in the cases associated with flexions, lacerations, or sagging of the pelvic floor, after the adoption of the necessary operative measures to correct these conditions.

As to the therapeutic measures, directed especially to the uterine inflammation, the value of rest in bed, saline laxatives, copious hot antiseptic douches, intrauterine injections of iodized phenol, and vaginal tampons saturated with glycerin and boroglyceride, or ichthyol, was recognized, and these measures were resorted to in most cases for periods varying from three days to two weeks, as preparatory to the more radical measure of curettage. In a limited number of cases (fifteen in all) the treatment was limited to these measures. Most of these cases were treated during the earlier years of the work, before the superior efficiency and safety of the curette had been appreciated.

Curettage was used in 157 cases. It was done in all cases with the same vigorous precautions for securing asepsis that would have been employed for a hysterectomy. The position of patient and the manner of bringing the uterus down to facilitate the required work is shown in Fig. 2.

Preliminary rapid dilatation of the uterine canal up to a diameter of one and a quarter inches has been the rule. For doing this the Goodell dilator has proven to be a very satisfactory instrument. For the curettage itself a firm, sharp curette has been used, by means of which the superficial, spongy, and œdematous layer of the endometrium could be thoroughly scraped away with certainty. The routine procedure has been to go over the whole surface of the endometrium with a narrow curette first, and then with a broader one, in order to secure the more thorough removal of the altered mucosa. Thorough and somewhat prolonged irriga-

tion of the uterine cavity is then done, using a hot solution of boracic and salicylic acids, the solution of Thiersch. No special "reflux" irrigating tube has been found necessary for the safe and thorough doing of these intrauterine irrigations; simply a glass female catheter attached to the tubing of the reservoir of irrigating fluid answering every purpose, provided the preliminary dilatation of the canal has been done. The object of this irrigation is threefold, to remove all *débris* that may remain, to check bleeding, and to lessen the con-



FIG. 2.—Showing method of exposing uterus preparatory to operative attack upon it.

gestive reaction consequent upon the traumatism of the scraping. The practice of injecting into the uterine cavity, at this stage, tincture of iodine or a mixture of tincture of iodine and carbolic acid, as recommended by some authors and often practised, has not been adopted, partly because of the amount of devitalized material produced by its escharotic action, which remains to be cast off, and which during the shedding process may become a nidus of new infection, and partly because the demonstrated absence of active patho-

genic organisms, as shown by the series of tests already described, has removed the assumed indication for the topical employment of germicides. Packing the cavity of the uterus with iodoform gauze has likewise been omitted, except in very rare instances, in which the persistence of active bleeding required the pressure of a tampon to control it. It should not be overlooked, however, that after curettage, however carefully and thoroughly done, there must remain many minute shreddy filaments of the mucosa ready to fall into necrosis, and that during the period of congestive reaction a local condition quite favorable for reinfection exists, to avert which the presence of an inhibitory agent, such as iodoform or oxide of zinc, is indicated. To satisfy this indication, I have finally settled down upon the injection into the cavity of the uterus of a 10 per cent. emulsion of iodoform. This emulsion is injected through the catheter used for the previous irrigation, and a sufficient amount of it is thrown in to distend the uterine cavity, and freely flow out along-side the catheter. With the same end in view a liberal amount of powdered oxide of zinc has in many cases been sprinkled upon the vaginal surfaces adjacent to the cervix. In the cases of laceration of the cervix, or hyperplasia, requiring resection or amputation, the required operations have been proceeded with immediately after the completion of the curettage. When curettage alone has been done, the patient has remained in bed for one week; if trachelorrhaphy only has been combined with it, two weeks' confinement to bed has been the rule; if perineorrhaphy also has been done, three weeks.

Of six cases of *endometritis hæmorrhagica*, cure was secured by a single curettage in two instances; by a second curettage, after an interval of two months, in one instance; by a third curettage, combined with partial amputation of the cervix, in one case; in the fifth case, a multiparous woman, fifty-one years of age, who during the six years previous had been curetted four times for the relief of a menorrhagia, with temporary relief each time, returned to the hospital

again profusely bleeding from her uterus. Both ovaries were now removed. She recovered without incident; the hæmorrhage ceased; and during the seven years which have elapsed since the oöphorectomy to the date of this report, she has remained in good health, supporting herself as a laundress. The sixth case was a multiparous woman, thirty-six years of age, who had been suffering from menorrhagia for seven years, during which time she had been curetted three times. For eleven months previous to her admission to the hospital the tendency to hæmorrhage had been greater than before, and her prostration from loss of blood had become great. She was subjected to vaginal hysterectomy, from which she made a smooth recovery. Microscopic examination of the removed uterus revealed merely hypertrophied glandular elements in the mucosa, dilatation of the venous sinuses, and hyperplasia of the muscular elements.

Vaginal hysterectomy was resorted to for the relief of a metritis, which persisted after the removal of the appendages, in the case of a woman, forty-four years of age, who had developed metro-salpingo-ovaritis after childbirth, twenty-six years previously. Notwithstanding the castration she continued to have irregular uterine hæmorrhages during a period of two years, together with uterine pain and offensive leucorrhœa. Curettage was then done, after which the hæmorrhages ceased, but the other symptoms persisted. Finally, after two more years, the uterus itself was removed; a smooth recovery, and ultimate cure of all pelvic symptoms resulted.

Two cases only of *acute puerperal metritis* were treated in this service during this period.

A woman, thirty-one years of age, was admitted eighteen days after a premature labor and delivery of a six-months' fœtus. When admitted she presented the signs of acute metro-salpingitis and pelvic peritonitis, with profound general septicæmia. The uterus was curetted and packed with iodoform gauze; the retrouterine peritoneal cul-de-sac was opened freely from the vagina and an iodoform gauze drain put in place. After tem-

porary improvement, the signs of progressing septicæmia reasserted themselves, and death occurred at the end of three weeks after admission. The autopsy revealed, in addition to the pelvic infection, the presence of chronic ulcerative endocarditis, thrombosis of both common iliac arteries, and of the abdominal aorta, and gummata of the kidneys and of the spleen.

In the second case the woman, twenty-five years of age, had been delivered of a seven-months' foetus five days previously. On the third day septic metritis developed. When admitted to the hospital she was delirious, with a pulse of 140, temperature of 102° F., great hypogastric tenderness, and abundant, foul, lochial discharge. Examination revealed a moderate tear of the perineum, a bilateral tear of the cervix, and in the vagina necrotic masses of placenta. Curettage and irrigation of the uterine cavity was at once done, and a tampon of iodoform gauze placed. Immediate improvement and a smooth recovery followed. Five weeks later the tears of the perineum and cervix were repaired.

(TO BE CONTINUED.)

EXTRAPERITONEAL RUPTURE OF THE BLADDER COMPLICATED BY FRACTURE OF THE PELVIS. REPORT OF A RECENT CURED CASE, WITH A STUDY OF NINETY CASES COLLECTED FROM LITERATURE.¹

By JAMES F. MITCHELL, M.D.,

OF BALTIMORE.

THROUGH the kindness of Dr. Bloodgood, resident surgeon in the Johns Hopkins Hospital, I am permitted to report the following case:

A. A., Lithuanian woman, aged fifty-two years, was admitted May 20, 1896, in the service of Dr. Halsted. On May 19, about 11 P.M., ten hours before admission, she was thrown from a wagon, the wheels passing over the hips and lower abdomen at the level of the anterior iliac spines. On admission at 9 A.M., ten hours after the accident, the pulse is 100 to 120; temperature, 100° F., mental condition seems to be one of stupor. There is frequent moaning, and when the left hip is moved she cries out with pain. Over the lower abdomen and thighs the skin has been scratched and is covered with gravel and dirt, the entire superficial epidermis seeming to have been brushed away; but at no point is the fat exposed. The abdomen is not distended nor tender except over the skin bruises, and there is no muscle spasm nor any evidence of intra-abdominal injury. At 10.30 A.M. catheterization yielded 140 cubic centimetres of smoky urine, with a sediment of blood-corpuscles, and at 2.30 P.M., four hours later, 160 cubic centimetres of similar urine. On distending the bladder with 500 cubic centimetres of boric acid solution not more than 250 to 300 cubic centimetres could be withdrawn, and examination by means of a speculum showed the bladder

¹ From the Service of William S. Halsted, M.D., in the Johns Hopkins Hospital.

to be quite empty, demonstrating conclusively a rupture. It was impossible to ascertain whether urine was passed before admission, but between admission and operation there was no attempt to void urine, and there was no dribbling.

Operation, by Dr. Bloodgood, seventeen hours after the accident, under ether. On opening into the space of Retzius, through the middle line, it was found filled with a large quantity of blood-stained urine, which was not ammoniacal, and there was as yet no sign of inflammation. The peritoneum was pushed up to within four centimetres of the umbilicus, and in the lumbar regions almost to the margins of the twelfth ribs. This fluid was carefully sponged out, and the peritoneal cavity opened in the middle line to examine the bladder for any intraperitoneal opening. As none could be found and there was no fluid in the peritoneal cavity, the peritoneum was closed with a double row of silk-sutures. The opening in the bladder was demonstrated by passing a silver catheter through the urethra. It appeared to be about two centimetres to the left of the median line at the level of the pubes,—that is, just behind the seat of fracture, which was in the ramus of the left pubes. The line of fracture was oblique and two ragged points projected towards the bladder. The bladder wound was closed with silk sutures not including mucous membrane. Lateral incisions were then made in both inguinal regions, and the three wounds were packed with bismuth gauze, the upper half of the median incision being closed with two mattress sutures in the recti muscles, and a continuous subcutaneous silver suture. There was no loss of blood, and the pulse was excellent at the end of the operation. Temperature, 100.2° F.; pulse, 106. Cultures and coverslips from the extravasated fluid were negative, and there were only a few leucocytes.

May 21.—Patient passed a fairly comfortable night. From 8 P.M. yesterday until noon to-day she was catheterized seven times, twelve to thirty-five cubic centimetres of urine being obtained each time, amounting in all to 162 cubic centimetres of bloody urine. The gauze on the abdomen is saturated with urine, showing that the sutures of the bladder have not held or that there is another rupture. Temperature, 102.2° F.; pulse, 106 to 110; respiration, 30 to 35; condition of stupor more marked than on admission (3.30 P.M.). Patient placed in bath

of water at 100° (8 P.M.). Patient has been in bath four hours. The pulse is 100 and of better quality; respiration, 24, and decidedly improved; temperature, 100.8°. The condition of stupor has been replaced by a much brighter mental state, and the patient looks a great deal better.

May 26.—The patient was taken out of the tub for four and a half hours, during which time no urine leaked from the wound. There was some pain and a little hæmorrhage. The removal of the packing was followed by a rise of temperature to 102° F., but no discomfort.

June 8.—The patient has been almost continuously in the bath since May 21 (eighteen days), being removed only for an hour at a time to clean the tub, and then she cries to be returned. The pulse has been good, but there has been continuous fever from 100.5° to 101° F., and yesterday, after examination and removal of two small pieces of bone from the fracture, the temperature reached 103.5°. The packing has been out since May 26 (seventh day). The lumbar wounds closed two days later, and the brush-braze wound has entirely healed. The abdomen is soft and there is no evidence of infiltration beyond the suprapubic sinus. Appetite and general condition good.

June 27.—There has been more or less fever during the past three weeks, and in the last four or five days several shaking chills; the temperature in one instance reaching 107° F. Examination of the blood is negative, and there is no leucocytosis. The urine shows a faint trace of albumen and many polymorphonuclear leucocytes. The abdomen is soft and not distended, and nothing can be found indicating any accumulation of pus. Spleen and kidneys not palpable. On irrigation the opening between the suprapubic wound and the bladder is not large enough to prevent distention of the bladder, and 250 cubic centimetres can be retained. On examination of the suprapubic wound a small cavity was found just to the left of this sinus and communicating with it by an opening two to three centimetres in diameter. This was thoroughly dilated with the index-finger and packed with bismuth gauze. Extravasation of urine into this cavity may explain the chills and temperature. No other explanation has been found.

July 20.—Following the dilatation of the above cavity the temperature fell rapidly, and there were no more chills and no

rise of temperature. The patient was removed from the bath on June 28, forty days after the accident. Since then the sinus and bladder have been irrigated daily with boric acid solution, and to-day the gauze removed from the sinus is slightly moist with urine. The sinus is closing rapidly. Except for some swelling, and pain in the left leg and hip, the patient has been fairly comfortable, and for two days has been up in a wheel-chair, —two months since the accident.

September 2.—The general condition is much improved. The appetite is good and the patient rests comfortably. The suprapubic sinus is still open, its external orifice barely admitting the tip of the little finger, and a probe passed to the bottom strikes roughened bone. No mobility can be obtained at the seat of fracture. Patient voids urine without difficulty, and the urine is greatly improved.

September 29. The sinus is about two centimetres deep, and does not communicate with the bladder or seat of fracture. The patient has been walking without difficulty for some time, although there seems to be some motion at the seat of fracture. The urine contains only a few leucocytes and is acid.

October 8.—Discharged. Sinus closed and urine clear.

December, 1896.—Patient returns with a small reducible hernia, two centimetres long, in the scar in the right groin.

February 13, 1897.—Operation for hernia.

March 3.—Discharged well. Patient has recovered her normal state of health. She walks without difficulty, and there is no evidence of mobility at the seat of fracture.

Considering the great numbers of surgical cases of all kinds treated in hospitals, neither fracture of the pelvis nor rupture of the bladder is of frequent occurrence; for statistics show that in Berlin in 10,867 surgical cases there were only three ruptured bladders, and in London in 16,711, only two. In the Johns Hopkins Hospital, among 7000 surgical cases there have been three ruptured bladders.

It is generally stated that fractures of the pelvic bones compose about 1 per cent. of all fractures. Either lesion is a serious one, but with the two combined the prognosis is always grave.

According to its relation to the peritoneum, the rupture may be one of three varieties,—intraperitoneal, subperitoneal, and extraperitoneal. To the last in combination with fracture of the pelvis we will confine our attention as bearing directly on the case just reported. We have collected ninety similar cases scattered through the literature of the past century, and on an analysis of these reports base the remarks which follow. In many instances the reports are very meagre, and cause the statistician much trouble in collecting and analyzing cases.

The injury is met with much more frequently in men than in women, and most commonly between the ages of twenty and sixty,—that is, in the most active period of man's life, when his habits and occupation expose him to violence. Harrison, of Dublin, has thought the greater frequency in men due also to the greater size of the female pelvis, and because of the pad offered by the uterus as a protection to the bladder. In boys the bladder is not as likely to be allowed to become distended,—an important factor in the causation of rupture,—while after sixty a man has usually retired from active and dangerous service.

As might be imagined, the direct cause is traumatism of some violent character, for example, the passage of a wheel over the body, as in the present instance. Fully one-third of all the cases are due to this cause alone. Many are caused by a fall from a height or a crushing weight received on the lower abdomen. An interesting case is recorded in which the man was thrown from his horse, landing rather forcibly on the ground in a sitting posture. The symphysis was separated and the bladder wall torn asunder. Another man, while intoxicated, stepped from a second-story window which he mistook for the door. He alighted on one foot, and sustained a fracture of the pelvis complicated by ruptured bladder.

As a predisposing cause alcohol ranks high, not only on account of greater exposure to violence in intoxicated persons, but owing also to the fact of the increased liability

to distention of the bladder and the consequent loss of tone, elasticity, and resistance of its walls. As to the immediate causes of the tear in the bladder walls opinions differ. Undoubtedly many are due to a continuation of the same crushing force that fractured the pelvis, but in a great number the cause is by no means so evident. A considerable proportion can be attributed to direct penetration of the bladder by a displaced or fractured bone. In twenty-one cases it is stated to have occurred, though from the position of the tear and the nature of the fracture in many other cases it must be much more common. Still others are due to concussion favored by a wall distended and weakened by chronic alcoholism.

The bladder when empty lies behind and wholly protected by the pubic bones, and it would be difficult to conceive of a rupture of an empty bladder caused by actual pressure without penetration by bone, as in cases where there is simply a separation of the symphysis without any antero-posterior displacement. Allis explains such a rent as being due to actual tearing apart of the bladder wall by the anterior ligaments which connect the front of the bladder with the pubic bones, one on either side of the symphysis. When the bladder is distended the walls themselves are weakened by a separation of the muscular fibres, and the anatomical position is much more favorable to rupture; for the bladder then rises above the symphysis pubis and in part loses the protection afforded by it. The opening is most often in the anterior wall communicating directly with the space of Retzius. It was situated here in 63 per cent. of the reported cases. Next in frequency comes the neck as a seat of rupture, while in a few instances the rent is in the side or base.

Fracture of the pelvis is oftentimes multiple, and by far the commonest location is in the pubic bones,—forty-nine cases are thus recorded. Separation of the symphysis pubis is of frequent occurrence, while tearing apart of the sacro-iliac synchondrosis is not very uncommon. Fractures of other bones are not so numerous, the sacrum and ischium

being about equally often, and the ilium rarely involved,—the latter only six times in our collection.

The symptomatology is quite definite. After the accident the patient is usually unable to walk or even to rise from the ground, and is often rendered unconscious, though accounts are given of patients walking some distance. Peaslee reports a case of a man who, with seven fractures and a ruptured bladder, could actually walk a few steps. The subjects often describe a sensation as of something tearing within them at the time of the accident. They are brought to the hospital in a semistupid condition, complaining of intense pain in the hypogastric region, or at the seat of fracture. Many go at once into a state of collapse or coma, from which they never rally, dying in a few hours. A pretty constant and characteristic symptom is a great desire to micturate, with either total inability to pass any urine or the passage of a small amount of blood-stained urine or pure blood. Sometimes, however, urination is not interfered with, and the patient voids perfectly clear urine. These are rare exceptions. Again, the patient may at first pass no urine, but after a time be able to do so. There may be one or repeated shaking chills.

The condition of the patient depends somewhat on the time elapsed since the accident. Very commonly it is one of collapse with marked pallor, rapid and weak pulse, hurried and shallow respiration, and high temperature. The body is bent forward and the legs drawn up. There may be vomiting and diffuse abdominal pain, with distention and tenderness, and signs of general peritonitis; but this picture by no means always denotes involvement of the peritoneum in the rupture. Tumefaction, due to extravasation of urine and blood, may be seen in various localities according to the situation of the rupture of the bladder or the fracture of the pelvis, and there may be localized abdominal dulness. Extravasation of urine may be absent entirely or may be extreme, and yet overlooked, because, on account of the violence necessary to the production of the lesion, it has not

followed the classical paths. It has been known to ascend as high as the shoulders or to follow the psoas muscle, stripping up the peritoneum as far as the kidneys. In one case, at the time of the accident a rounded and fluctuating tumor appeared on the thigh not far above the knee. This, on being opened some two weeks later, was filled with urine, pus, and blood. If seen later there is likely to be infection, especially if the patient has been catheterized.

From the signs given the diagnosis can generally be made, but there are certain aids which make the extraperitoneal rupture plainer and distinguish it from the intraperitoneal form. Catheterization yields important information. As a rule, one obtains by the catheter only a small amount of urine, and this is mixed with blood. Sometimes catheterization is impossible. In rare instances clear urine has been obtained and quite frequently nothing at all, which latter condition Willard explained in his case as being due to suppression of urine rather than escape from the bladder. Sometimes the catheter will pass through the rent in the bladder, and then a large amount of bloody urine may be withdrawn, and one may even feel the tip of the catheter by rectum or through the abdominal wall. The ordinary procedure, and a very useful one, is to inject into the bladder a known amount of some mild solution (in the present case half-saturated boric acid solution was used), and then measure the fluid withdrawn, any considerable decrease indicating leakage through a rupture. Sometimes the patient will feel the fluid escaping unnaturally from the bladder. This method has been opposed on the ground of being dangerous in case of intraperitoneal rupture; but as immediate laparotomy is here indicated, it is not an important objection, and with proper precautions the gravity of the case should not be increased. In locating the position of the tear during operation, this injection is also very useful. Walsham suggested that air be introduced by means of a hand-ball apparatus as a substitute for fluid. Rivington has advised a preliminary perineal incision and digital examination of the bladder as a means of diag-

nosis. Rectal, vaginal, and cystoscopic examinations occasionally give useful data in ruptures about the neck; and rectal and vaginal examinations are especially useful in the location of fractures.

The prognosis has always been grave, though with the progress of surgery the death-rate has greatly lessened. Hippocrates thought rupture of the bladder necessarily fatal, while Galen admitted the possibility of recovery in extraperitoneal injuries. In 1878 Bartels collected 169 cases of ruptures of all varieties, with a mortality of 89.3 per cent., and at that time there was only one recorded recovery in intraperitoneal rupture. Cramer in 1896 gave the mortality for all forms as 54 per cent. This drop in the death-rate has been to a large extent due to the improved treatment of intraperitoneal cases. In our ninety reports there were fifteen recoveries, making the mortality 83.3 per cent. Taking only those which have occurred in the last fifteen years, we find twenty-four, with seven recoveries,—*i.e.*, a mortality of 70.8 per cent.; so that in extraperitoneal rupture the decrease in deaths has not been so great, and it is still considered a very grave injury and one whose treatment has been rather unsatisfactory. When we consider how likely it is to have only recoveries reported, it is not probable that this estimate is an exaggerated one. In the majority (55 per cent. of our collected cases) death occurred in the first four days, while in the first week 73 per cent. died. Those surviving the first few hours rally from the shock and later show signs of peritonitis or extravasation of urine; the lingering cases die generally of septicæmia.

At autopsy the space of Retzius and other seats of infiltration are found filled with a bloody urine and purulent material, and the tissues about are necrotic and sloughing. The sloughing may reach an extreme grade. General peritonitis may result or the peritonitis may be more or less localized, according to the extent of the infection. Spontaneous cure is possible even in cases of extensive infiltration and abscess-formation.

It is well known that perfectly sterile urine flowing over tissues has little effect except when absorbed in large amounts, and that it does not materially interfere with the repair of open wounds; but the flow, if continued for a long time or dammed up without exit, does provoke irritation and lower resistance, so that we have a most favorable medium for infection. Strauss and Tuffier have done some interesting work to shed light on this point. They injected aseptic urine into the peritoneal cavity, space of Retzius, and muscle of dogs, and found that the urine was absorbed and there was no reaction. On repeating these injections, using urine mixed with blood, ammonium sulphide, or ammonium chloride, the same result was obtained. On cutting one ureter, however, and allowing the urine to flow into the peritoneal cavity, the dogs died in eight to twenty days of uræmic poisoning and peritonitis. They conclude that sterile urine in itself has no action, but that prolonged exposure so irritates and lowers the resistance of the parts as to allow organisms to pass through the intestinal wall and set up a peritonitis. Unfortunately they do not state what organisms were concerned.

Urine is in itself, however, an excellent culture medium and, on account of the common practice of catheterization, is rarely if ever sterile for any length of time after the accident with which we are concerned; and thus it acts as a carrier of infection.

The treatment, therefore, is plainly indicated,—viz., immediate relief of the extravasated urine and prevention of reaccumulation by proper drainage and suture.

As far as the fracture of the pelvis is concerned little is to be done except to fix the parts, though it is sometimes necessary to remove spicules of bone or wire the fragments together.

To get rid of the extravasated urine has been a simple matter, but the question of efficient drainage seems to have been a difficult one. The earliest cases were treated by hot applications, leeches, and bloodletting, and two recoveries are

reported in fifty-three cases where no other treatment, save these and catheterization, was employed.

In all thirty-seven were treated by various operative procedures with a resulting mortality of 64.9 per cent. In many of the recoveries the convalescence has been slow and tedious, with a history of long-continued suppuration, and the existence of one or more fistulous tracts for months or years.

Statistics show nothing as to the advantages of early operation; for there were more recoveries where the operation was in the second week. But we know that it is best to operate as soon as possible, and it is a question as to whether these late cases would not have recovered spontaneously by rupture of the abscesses and formation of fistulæ.

The first attempts at operation amounted merely to incisions for extravasation plus a catheter retained in the urethra. Of eight cases so treated, three recovered. The recoveries were cases which had gone on to abscess formation, and all that was done was to open the abscesses.

In 1845, Walker, of Boston, first employed lateral perineal cystotomy in a case of ruptured bladder, and drainage through this incision was successful, and the patient recovered. After that perineal incision and drainage was the favorite method, and in sixteen cases there were four recoveries.

Abdominal incision was employed five times, with one recovery, and then suprapubic cystotomy, with or without a counter incision in the perineum, took its place, and has been up to the present time the ordinary method of dealing with this injury; but of eight patients treated in this way only three recovered.

In three cases, including the present one, the continuous bath has been used to prevent absorption and for better drainage, and all of these have recovered. While the bath treatment of wounds is itself an old one, and has been long known and employed, both in this country and abroad, its application in such injuries as the present one seems to have been gradual, and its great value should be insisted upon.

In 1878, Bartels speaks of "giving baths" to a case in which there was extensive suppuration, and the patient got well; but he does not go into details as to the time the patient remained in the baths. In 1891, Rose, after doing a suprapubic operation for rupture, found that ordinary dressings were not sufficient, and says that "therefore the patient was every day put in a continuous bath for several hours without any dressing." This was continued for twenty days, and then the bath was used only every second or third day. The second case in which it was employed was in 1896, by Wiesinger. Here on the seventeenth day an abscess was opened over the seat of fracture, and the patient put in a continuous bath. The abscess was healed on the forty-second day.

It would seem, then, that whether there be merely incisions for extravasation or whether suprapubic cystotomy or perineal section be performed, the best results can be secured by placing the patient in a continuous bath.

In view of a forthcoming report we will not go into the particulars of the management of the bath; but, as far as the comfort of the patient is concerned, little can be said against it. While at first patients may object to the bath, probably more from the thought of it than from actual discomfort, they soon grow accustomed to it, and, as has been said, the present patient when removed from the tub cried to be returned.

Dr. Bloodgood has already reported (not yet published) a case of ruptured urethra in which the bath was used with excellent result. It has been used by Schede in cases of extravasation of urine, and last year Puzey, in London, reported two cases of ruptured urethra, which recovered under the bath treatment. Thus it would seem to be especially adapted to this class of injuries, where efficient drainage is so important and so difficult.

ANALYSIS OF CASES.

<i>Sex.</i> —Males	84 = 94.4 per cent.
Females	5 = 5.6 “
<i>Age.</i> —One to ten years	4
Ten to twenty years	8
Twenty to thirty years	20
Thirty to forty years	18
Forty to fifty years	10
Fifty to sixty years	11
Sixty to seventy years	4
<i>Cause.</i> —Crushed by weight falling on body	23
Run over by wagon	25
Fall from a height	22
Struck by engine or car	4
Crushed between wagons or cars	9
<i>Result.</i> —Whole number of cases	90
Whole number of deaths	75 = 83.3 per cent.
Whole number of recoveries	15 = 16.7 “
<i>Time of Death.</i> —First day	9
Second day	14
Third day	7
Fourth day	10
Fifth day	5
Sixth day	5
Seventh day	3
Total first week	<u>53</u>
First week	53
Second week	9
Third week	2
Fourth week	4
Fifth week	1
Sixth week	2
Six months	1
Fourteen months	1

Time of Operation.

Time after Accident.	Total.	Deaths.	Recoveries.	Mortality.
Within twenty-four hours	11	7	4	63.7 per cent.
“ forty-eight “	2	2	0	100.0 “
“ four days	5	5	0	100.0 “
“ two weeks	7	2	5	28.6 “
“ three weeks . . .	1	1	0	100.0 “

<i>Bones fractured.</i> —Multiple fracture	42
Os pubis	49
Sacrum	9
Ischium	9
Ilium	6
Separation of symphysis pubis	31
Separation of sacro-iliac synchondrosis	10
Penetration of bladder by bone	20
<i>Position of Rupture.</i> —Anterior wall	41 = 63.2 per cent.
Posterior	1
Neck	12
Side	5
Fundus	3
Base	3

Operation.	Total.	Died.	Recov'd	Mortality.
Unoperated	53	51	2	
“ and catheterized	24	24	0	
“ and hot applications	2	2	0	
“ and retained catheter	5	4	1	= 76.2 per cent.
Operated	37	24	13	= 64.9 “
Incision for extravasation	5	4	1	
“ “ “ and retained catheter	3	1	2	= 62.5 “
Perineal incision	8	6	2	
“ “ and retained catheter	2	0	2	
“ “ and drainage-tube	1	1	1	
“ “ and incision for extravasation	1	1	0	
“ “ and incision for extravasation and retained catheter	1	1	0	
“ “ and abdominal incision	1	1	0	
“ “ and suprapubic incision	1	1	0	
“ “ and suprapubic incision and lithotomy-tube	1	1	0	= 75.0 “
Abdominal incision	2	2	0	
“ “ and retained catheter	2	1	1	
“ “ and suprapubic incision	1	1	0	= 80.0 “
Suprapubic incision	2	1	1	
“ “ and retained catheter	4	2	2	= 50.0 “
Bath and incision for extravasation	1	0	1	
“ suprapubic incision	1	0	1	= 00.0 “

ABSTRACT OF CASES COLLECTED FROM
LITERATURE.

(1) Ollenroth, 1795 (Lesur, Thesis, Paris, 1888). Man. Crushed under a wall. Rupture in anterior part of bladder. Symphysis pubis separated. Died in fifty-six hours. Autopsy: Peritonitis; infiltration of urine.

(2) Liston, 1830; *London Medical Gazette*, 1830, Vol. vii, p. 29. Boy; aged twelve years. Run over by wagon. A little urine obtained by catheter. Collapse. Died in three days. Autopsy: Much urine in cellular tissue of pelvis; fracture of ischium and pubis, from which a splinter perforated bladder on anterior wall.

(3) Earle, 1833; *Medico-Chirurgical Transactions*, 1833, p. 257. Man; aged sixty to seventy years. Fell from horse. Only blood by catheter. Perineal incision. Died in forty hours. Autopsy: Separation of symphysis pubis and sacro-iliac synchondrosis. Extravasation of urine in perineum. Prostate torn from bladder.

(4) Nivet, 1837; *Bulletin de la Société anatomique de Paris*, 1837, p. 194. Girl; aged sixteen years. Crushed between wagon and wall. Urine oozing from wound over groin. Infiltration. Peritonitis. Died in twelve days. Autopsy: Extraperitoneal rupture in neck of bladder; fracture of pubis.

(5) Hall, 1843; *Provincial Medical Journal*, London, 1843-44. Man. Run over by wagon. Retention. No urine obtained by catheter. Retained catheter. Died in forty-five hours. Autopsy: Separation of symphysis pubis. Right os pubis fractured and perforated bladder; ilium fractured; extravasation.

(6) Syme, 1843; *Lancet*, 1848, Vol. i, p. 287. Man; aged thirty-two years. Fell while drunk. Pulseless. Desire and inability to urinate. Scrotum distended with blood. Catheter obtained only blood. Died in twelve hours. Autopsy: Rupture in fundus; separation of symphysis pubis.

(7) Lowe, 1845; *St. Bartholomew's Hospital Reports*, 1891, Vol. xxvi. Boy; aged nineteen years. Crushed by wheel. Separation of sacro-iliac synchondrosis. Rupture in anterior wall. Great infiltration. Continuous catheterization. Incisions on dorsum of penis, sides of scrotum, and thighs. Catheter removed in one month. Iliac abscess opened at end of seven months. Could work at end of two years. Living forty-five years later.

(8) Lyon, 1845; *Archives générale de Médecine*, 1845, Vol. vii. Boy; aged fourteen years. Crushed by wheel. Tumefaction of perineum; next day collapse, pain, vomiting; retention of urine; catheterization impossible. Operation: Twenty-four hours after accident. Perineal incision; large amount of bloody urine. Died in five days with signs of peritonitis. Autopsy: Great quantity of extravasated blood in peritoneal cavity; complete disorganization of soft parts; rupture of bladder on right side; fracture of right cotyloid cavity; separation of

ischium from pubis; double fracture of pubis with fragment of bone perforating bladder.

(9) Walker, 1845; Communication to the Massachusetts Medical Society, 1845, Vol. vii. Man; aged twenty-three years. Injured in railroad wreck. Collapse. Tumefaction from pubis to umbilicus. Fracture of right pubis and separation of left sacro-iliac synchondrosis. Catheter obtained a few ounces of urine. Operation: Twenty-four hours after accident; lateral perineal cystotomy. Immediate improvement. Fracture appeared healed twenty-five days later. In fifty-five days went to work.

(10) Watson, 1848; Monthly Journal of Medical Science, 1848. Man; aged thirty-three years. Run over. Desire and inability to urinate. Pain in perineum and above pubis. Catheterization yielded bloody urine. Swelling of hip, scrotum, and perineum. Operation: Fourth day; incisions over swelling. Death in eight days. Autopsy: Rupture in neck leading into abscess between bladder and sacrum; extensive pelvic fracture; blood and urine infiltration.

(11) Thouvenet, 1849; Société anatomique, 1849, Vol. xxiv. Man; aged twenty-seven years. Fall. Died in forty-four hours. Autopsy: Anterior rupture of bladder; urine infiltration in cellular tissue of pelvis; injury of the pelvic bones.

(12) Keate, 1850; (Hewitt, London Medical Gazette, 1850). Man. Run over. Separation of symphysis pubis. Pain in abdomen. Bloody urine by catheter. Typhoid symptoms. Died in four days. Autopsy: Prostate torn from bladder; pelvic fracture; urine infiltration.

(13) Lente, 1850; New York Medical Journal, 1850, Vol. iv, p. 286. Boy; aged eighteen years. Crushed by cars. Bladder distended. Hot application. Second day urine passed voluntarily. Died in two days. Autopsy: No peritonitis; fluid not urinous in peritoneal cavity. Laceration of fundus of bladder; separation of symphysis pubis.

(14) Peaslee, 1850; American Journal of the Medical Sciences, Philadelphia, 1850, N. S., Vol. xix. Man; aged thirty years. Crushed by train. Fæces and urine through the perineal wound. Walks two or three steps. Perineal wound communicating with rectum and neck of bladder. Pelvic abscesses. Great sloughing. Chills on thirteenth day. No delirium till twenty-four hours before death. Died in forty-one days after accident. Autopsy: Seven fractures of pelvis. Large extraperitoneal pus-cavity.

(15) Hewett, 1850; Lancet, London, 1850, Vol. i, p. 573. Man; aged fifty years. Jumped on by another man. Admitted to hospital two days after accident. Catheterization yielded a pint of bloody urine. Some days later fluctuating tumors above pubes and in inguinal regions. Operation: Twelfth day. Incision over left iliac region, letting out three pints of pus; large sloughs; urine through incision. Died in twenty-three days. Autopsy: Pus and sloughing material in prevesical space; rupture on anterior wall of bladder opening into pus-cavity.

(16) Hewett, 1850; Lancet, London, 1850, Vol. i, p. 573. Boy; aged twelve years. Mass of iron fell on him. Admitted after twenty hours

in collapse. Catheter obtained bloody urine. Death on sixth day. Autopsy: Two ruptures in anterior wall of bladder; extensive extravasation into pelvis, thighs, and scrotum; large sloughs; extensive fracture of pelvis; blood in peritoneal cavity.

(17) Hewett, 1850; *Lancet*, London, 1850, Vol. i, p. 573. Man; aged fifty years. Died twenty-two hours after accident. Autopsy: Rupture on left side leading into subperitoneal cellular tissue; extensive effusion of bloody fluid.

(18) Hewett, 1850; *Lancet*, London, 1850, Vol. i, p. 573. Man; aged thirty-eight years. Died five days after accident. Autopsy: Rupture in neck; urine infiltration and sloughing in iliac regions, thighs, scrotum, and hypogastrium; extensive fracture of pelvis.

(19) Hewett, 1850; *Lancet*, London, 1850, Vol. i, p. 573. Man; aged thirty-two years. Run over. Catheter drew bloody urine. Abdominal pain and tension, and death on fourth day. Autopsy: Rupture on right side leading into small circumscribed cavity in cellular tissue; extensive infiltration; laceration of symphysis pubis.

(20) Hewett, 1850; *Lancet*, London, 1850, Vol. i, p. 573. Man; aged thirty-two years. Crushed by falling timber. Catheterization, but no urine. Swelling of scrotum, perineum, and lower abdomen. Operation: Incision of urethra and swollen parts; free escape of urine; sloughing of incisions. Death on fourth day, in low muttering delirium. Autopsy: Extensive fracture of pelvis; rupture of bladder in fore part immediately behind symphysis, communicating with cavity containing blood, urine, and pus; peritoneum extensively stripped up; no peritonitis.

(21) Hewett, 1850; *Lancet*, London, 1850, Vol. i, p. 573. Man; aged thirty-four years. Fall from height. Died two hours after admission. Autopsy: Bladder ruptured immediately behind pubes; separation of symphysis and fracture of pelvis.

(22) Warren, 1851; *American Journal of the Medical Sciences*, Philadelphia, 1851, N. S., Vol. xxii. Man; aged thirty years. Crushed by falling earth. Died on way to hospital. Autopsy: Peritoneal cavity filled with blood; infiltration of iliacus and psoas muscles; bladder ruptured posterior to symphysis; fracture near symphysis, through ilium, ischium, and sacro-iliac synchondrosis.

(23) Currie, 1853; *Medical Circular*, London, 1853, Vol. ii, p. 465. Man; aged twenty-two years. Caught under a cart. Catheterized. Operation: Two weeks; incision one and a half inches long between tuber ischii and anus; eight to ten pints of urino-purulent material evacuated; catheter retained in urethra. Health restored in four months.

(24) Varreu, 1854 (*Lesur*, Thesis, Paris, 1888). Man; aged thirty years. Crushed. Died in an hour. Autopsy: Rupture behind symphysis; separation of symphysis and sacro-iliac synchondrosis; fracture of pelvis.

(25) Stanley, 1857; *British Medical Journal*, 1857. Boy; aged eight years. Gate fell on him. Perineal ecchymosis. Died on sixth day. Autopsy: Peritoneal cavity healthy; fracture of right pubis; separation of

sacro-iliac synchondrosis; four ruptures in muscular and mucous coats of bladder; peritoneum not opened; cellular tissue of pelvis sloughing.

(26) Croly, 1859; Dublin Medical Press, 1859, Vol. xli. Man; aged sixty-six years. Run over. Clear urine by catheter. No inclination to urinate. Died on second day. Autopsy: Fracture of right pubis; longitudinal rupture on anterior surface; around bladder urine mixed with blood; bladder contracted; peritoneal cavity healthy.

(27) Faure, 1866; Bulletin de la Société anatomique de Paris, 1863, Vol. xxxviii. Man. Died in four days. Autopsy: Numerous fractures of pelvis; transverse rupture of bladder on posterior wall; blood in left iliac fossa and between peritoneum and ilio-psoas muscle.

(28) Schoemaker, 1862; Nederl. Tijdschr. v. Geneesk., 1862. Man; aged twenty-one years. Fall. Large amount of dark-red urine by catheter. Could neither stand nor walk; pain on moving right leg. Retention of urine. Died in fourteen days. Autopsy: Two ruptures on anterior wall; separation of symphysis; fracture of right pubis; urine and pus behind symphysis.

(29) Harrison, 1863; Dublin Medical Journal, 1863, Vol. ix. Boy; aged two and a half years. Run over. Urine passed voluntarily. Erysipelas of body wall on fourth day. Death on tenth day. Autopsy: Rupture on anterior wall; separation of symphysis and fracture of pubis.

(30) Tuefferd, 1864; Union Médical, Paris, 1864, 2d S., Vol. xxiii. Man; aged fifty years. Crushed under bricks. Great pain on motion. Tumor appeared on thigh just after accident, very sensitive, three centimetres below genito-crural fold, and descended almost to knee; not hard, but no fluctuation. Catheterization yielded urine tinged with blood. Catheter retained. Tumor of thigh became fluctuating on thirteenth day. Operation: Incision over tumor; blood, urine, pus, and oil from catheter. Catheter retained in urethra, but urine passed by wound with man on side. Wound in bladder in base and behind and to the right. Healed in thirty days.

(31) Rose, 1865; Charité Annalen, Berlin, 1865, Vol. xiii. Man; aged twenty-five years. Tree fell on him. Blood from urethra. Catheterization ineffectual. In two days bloody urine spontaneously, continuing three weeks. In two and a half months fistula, through which all urine passed. Bedridden nine months. Healing. In fourteen months external urethrotomy. Erysipelas. Death. Autopsy: Cavity between bladder and rectum, in which lay the catheter; united fracture of pubis.

(32) Fleming, 1866; Dublin Quarterly Journal of the Medical Sciences, 1866, Vol. xliii. Man; aged sixty years. Wall fell on him. Blood from urethra. Pain in region of bladder and symphysis. Urine by catheter. Died in forty-eight hours. Autopsy: Rupture between anterior ligaments; gas escaped from peritoneal cavity; no peritonitis; symphysis separated; sacrum fractured.

(33) Symes, 1866; Dublin Medical Press and Circular, 1866, Vol. i, p. 278. Man; aged forty-five years. Fall. Seen on eighth day. Retention of urine. Catheter drew urine, blood, and pus. Tumor over hypogastrium. Died on twelfth day. Autopsy: Two small rents in anterior wall; separation of symphysis; local peritonitis.

(34) Shaw, 1867; *Lancet*, London, 1867, Vol. i, p. 174. Man; aged fifty years. Fell while drunk. Catheterization yielded blood and urine. On second day hard, round, tender swelling in right iliac and hypogastric region, which on fourth day extended to umbilicus. Passed bloody urine voluntarily. Pain excessive. Died on fifth day. Autopsy: Both pubic bones fractured; left pubis perforated bladder twice; bladder empty; peritoneum stripped up; urine infiltrated everywhere causing muscles to look purplish; infiltration along ureters.

(35) Williams, 1867; *American Journal of the Medical Sciences*, 1867, N. S., Vol. liii, p. 446. Woman; aged fifty-three years. Run over. Desire and inability to urinate. A little bloody urine by catheter. Died in forty-eight hours. Autopsy: Extraperitoneal rupture of bladder caused by perforation by the fractured ischium.

(36) Burlingham, 1868; *American Journal of the Medical Sciences*, Philadelphia, 1868, N. S., Vol. lv. Man; aged twenty-five years. Fall. Pain and difficulty in walking. No desire to urinate. Extremely strong physique. Rupture in left side of neck of bladder. Compound fracture of sacrum; urine exuding through wound. Urine and blood by catheter. Continuous catheterization. Much sloughing. Pieces of bone from wound. Bedsores and abscesses. Enormous amount of pus. Delirium. Retained catheter, and urine passed by wound for seven months. Discharge of pus from wound a year after accident. Two years after accident: "He is at present suffering from one of those repeated prostrations which every time threaten his life."

(37) Grant, 1868; *Australasian Medical Journal*, Melbourne, 1868, Vol. xiii. Man; aged fifty-three years. Fell from horse, landing in sitting posture. Catheterization yielded blood. Died in twenty-six days. Autopsy: Blood in peritoneal cavity; separation of symphysis with rupture immediately behind.

(38) Seelye, 1868; *American Journal of the Medical Sciences*, Philadelphia, 1868, N. S., Vol. lv. Man; aged thirty-two years. Crushed by earth. Catheterization at first gave nothing, on second day blood and urine. Died on fourth day. Autopsy: Separation of symphysis; rupture in anterior part of fundus; abdominal cavity filled with four to six gallons of amber-colored fluid, "due to low form of inflammation, just sufficient to cause serous effusion. Peritoneum healthy."

(39) Logan, 1870; *New Orleans Journal of Medicine*, 1870, Vol. xxiii, p. 114. Man; aged forty-three years. Jumped from second story window. Pure blood by catheter. Autopsy: Separation of symphysis; fracture of sacrum; rupture in bladder beneath peritoneum; tissues infiltrated with blood and urine.

(40) Clark, 1872 (*Bartels, Archiv für klinische Chirurgie*, Vol. xxii, 1878). Man; aged twenty-nine years. Crushed between two beams. Operation on third day; perineal section; much blood and urine from the wound. Died on twenty-fifth day. Autopsy: Rupture of bladder; fracture of pubis and ischium.

(41) Gross, 1872; *System of Surgery*, Philadelphia, 1872. Young man. Fall. Great pain in lower abdomen. No external sign of injury.

Infiltration of urine into perineum, scrotum, and right hip; unable to urinate. Death in two weeks, of peritonitis and gangrene. Autopsy: Rupture of bladder; extensive fracture of ischium and pubis.

(42) Smith, 1872; *Dublin Journal*, 1872, Vol. liii. Woman; aged sixty years. Run over. Collapse. Retention of urine. Catheter drew urine and blood. Tumor in iliac region. Operation on fourth day; puncture of tumor; evacuation of gas, pus, and urine. Death on fourteenth day. Autopsy: Laceration of neck of bladder; fracture of ischium and both pubes; no peritonitis; no infiltration in pelvic cavity.

(43) Duetsch, 1873 (Bartels, *Dublin Journal*, 1872, Vol. liii). Man; aged twenty years. Caught between cars. Great pain in abdomen; vomiting; anuria; collapse. Catheterized daily. Abdomen tympanitic. Peritonitis. Died in forty-eight hours. Autopsy: Crushing rupture of bladder; no free urine in abdominal cavity; urine infiltration on both hips; separation of symphysis with depression of left pubis.

(44) Dickenson and Holmes, 1874; *St. George's Hospital Reports*, 1874-76, Vol. viii. Man; aged forty-two years. Fall. Fracture of ilium. Rupture of bladder. Operation: Perineal section because catheter could not be introduced; collection of urine behind symphysis. Died in forty-three days. Autopsy: Extraperitoneal rupture of bladder.

(45) Juedeu, 1874; *Deutsche Zeitschrift für Chirurgie*, Leipzig, 1874, Vol. iv. Man; aged thirty-five years. Fall. Chills. Suppuration and various complications. Operation on twentieth day; incision of fluctuating tumor in right inguinal region; evacuation of pus and urine. Died in six months. Autopsy: Fracture of pubis with perforation of bladder; hernia of liver through diaphragm.

(46) Rudall, 1874; *Australasian Medical Journal*, Melbourne, 1874, Vol. xix. Man; aged fifty-six years. Horse fell on him. Died in two days. Autopsy: Separation of symphysis; transverse rent in anterior wall of bladder.

(47) Teissier, 1875; *Lyon Médical*, 1875, Vol. xix, p. 440. Man; aged twenty-five years. Crushed under pile of wood. Urine and blood by catheter. Desire and inability to urinate. Death on third day. Autopsy: Six fractures; three fractures of pubis corresponding with three ruptures in anterior wall of bladder; bones perforating.

(48) Barth, 1876; *Bulletin de la Société anatomique de Paris*, 1876, Vol. li. Man; aged twenty-five years. Run over. Conscious. Intense pain. Urine and blood by catheter. Extreme tenderness over hypogastrium. Died in two days. Autopsy: Extravasation of blood and urine in subperitoneal cellular tissue; symphysis pubis torn apart; fracture of sacrum and pubis; penetration of bladder by bone.

(49) Fleming, 1877; *Clinical Records of the Injuries and Diseases of the Genito-Urinary Organs*, Dublin, 1877 (William Thompson). Man; aged forty years. Fall. Admitted at end of a week. Great desire with inability to urinate. Large irregular tumor in hypogastrium reaching to navel. Ecchymosis over pelvis, perineum, and scrotum. Died in twelve days. Autopsy: Abdominal muscles infiltrated; behind them an irregular cavity filled with fetid, bloody urine; bladder contracted

and lying in back part of this cavity; infiltration of pelvic cellular tissue with gas and pus; fracture of sacrum and separation of symphysis pubis.

(50) Fleming, 1877; *Clinical Records of the Injuries and Diseases of the Genito-Urinary Organs*, Dublin, 1877 (William Thompson). Boy; aged seven years. Run over. Unable to stand. Collapse. No external injury. Retention of urine. Pulse weak and fluttering. Skin cool. Catheter brought half a pint of clear urine. From sixth day urine voluntarily. Abdominal pain; no peritonitis. Death in eight days. Autopsy: Extraperitoneal rupture of bladder; blood extravasation in prevesical tissues; bone penetrating bladder on right side; fracture of both pubes and both ischii.

(51) Heath, 1877; *Lancet*, 1877, Vol. i, No. 19. Man; aged forty years. Engine bed fell on him. Shock and pallor and pain in abdomen. Scrotum swollen. Vomiting. Catheter drew bloody fluid. Delirium. Death in twenty-six hours. Autopsy: Blood and serous fluid in peritoneal cavity; subperitoneal infiltration with blood; longitudinal tear in anterior wall of bladder and at apex; bladder empty; peritoneum uninjured; separation of symphysis pubis and sacro-iliac synchondrosis.

(52) McDougall, 1877; *Edinburgh Medical Journal*, January, 1877. Man. Run over while drunk. Catheter drew blood and urine. Dulness above pubes. Second day urine not so bloody. Abdomen tender, distended, and tympanitic, except for dulness just above pubes. Signs of severe peritonitis. Catheter retained in bladder seven to ten days. Urine ammoniacal and purulent. Ilium fractured. Rapid recovery.

(53) Augar, 1878 (Chaboureaux, Thesis, Paris, 1878). Run over. Extraperitoneal rupture of bladder. Multiple fractures. Died in a few hours.

(54) Bartels, 1878; *Archiv für klinische Chirurgie*, Vol. xxii, 1878. Man; aged fifty years. Horse fell on him. Severe pain in right side of pelvis. Desire and inability to urinate. Right leg cannot be raised. Pulse weak. Fracture of pubis. Much bloody urine by catheter; few drops of urine spontaneously. Repeated catheterizations. First chill in thirty-six hours. In ten days swelling above and to inner side of hip. Operation: Incision; evacuation of pus and urine. Fistula formed through which all urine passed for months. Septicæmia and wasting. Baths. Cured. In nine months up on crutches. In fifteen months walked with a cane. Blind fistula persisting six years later.

(55) Chaboureaux, 1878; Thesis, Paris, 1878. Man; aged twenty-four years. Run over. Multiple fracture. Rupture in anterior wall of bladder. Died in four days.

(56) Chaboureaux, 1878; Thesis, Paris, 1878. Boy; aged fourteen years. Run over. Fracture of pelvis with extraperitoneal rupture. Operation: Perineal incision for infiltration. Died in six days.

(57) Chaboureaux, 1878; Thesis, Paris, 1878. Man. Run over. Symphysis pubis separated. Rupture of bladder behind symphysis. Died in twenty-four hours.

(58) Demme, 1863 (Bartels, Thesis, Paris, 1878). Man; aged twenty-seven years. Tree fell on him. Thirty-five hours later ecchymosis over

groin, perineum, and scrotum. Desire and inability to urinate. Sinking in of bladder region. Catheter goes aside into a roomy sac and draws a few drops of bloody urine. Operation on third day; incision. Infiltration. Death on sixth day. Autopsy: Fracture of pubis with piece perforating bladder; pus.

(59) Giralt, 1878; Hospital Gazette, New York, 1878, Vol. iv. Man; aged thirty-one years. Struck by car. Retention of urine. Bloody urine by catheter. Operation: Twenty-four hours; perineal incision and evacuation of urine. At end of a week pus from wound. Died in twenty-eight days. Autopsy: Pus and broken-down tissue in peritoneal cavity; rupture of bladder on anterior wall; fracture of both pubic bones.

(60) Guenzburg, 1854 (Bartels, Hospital Gazette, New York, 1878, Vol. iv). Man; aged forty-five years. Struck by beam. Severe abdominal pain. Desire and inability to urinate. Legs motionless. Death in sixty hours. Autopsy: Rupture of bladder next to symphysis; fracture of ilium and pubis; fluid blood in peritoneal cavity.

(61) Louis (Bartholemy, François Médical, 1878, Vol. xxv, p. 813). Man; aged fifty-five years. Died in seven days. Autopsy: Peritonitis; rupture in anterior wall; fracture of pubis; fragment of bone penetrating bladder.

(62) Nélaton (Chaboureau, François Médical, 1878, Vol. xxv, p. 813). Woman. Run over. Fracture of pubis with fragment penetrating bladder and vagina. Fragment of pubis removed by vagina. Recovery.

(63) Rénaud (Bartholemy, François Médical, 1878, Vol. xxv, p. 813). Man; aged twenty-four years. Fall. Quadruple fracture, with a fragment of pubis penetrating bladder. Died in four days.

(64) Savard, 1878; Bulletin de la Société anatomique de Paris, 1878, Vol. liii. Man; aged thirty-six years. Run over. Died in three days. Autopsy: Double fracture of pelvis and double rupture of bladder.

(65) Vinout (Chaboureau, Bulletin de la Société anatomique de Paris, 1878, Vol. liii). Man; aged thirty-two years. Fall. Separation of symphysis pubis and extraperitoneal rupture. Died in four days.

(66) Voillemier (Chaboureau, Bulletin de la Société anatomique de Paris, 1878, Vol. liii). Man; aged twenty-four years. Weight fell on abdomen. Fracture of pubis; separation of sacro-iliac synchondrosis; rupture of bladder. Death in five days.

(67) Morris, 1883; Lancet, London, 1883, Vol. ii. Boy; aged fifteen years. Run over. Catheterization yielded few drops of blood. Swelling in right iliac region. Operation: Ten hours; median incision from pubes to umbilicus; no urine, only bloody fluid in peritoneal cavity; no rupture found; abdomen closed. Death in twenty-four hours. Autopsy: Peritoneum separated from abdominal wall anteriorly; no break in peritoneum; scrotum and perineum distended with blood and urine; rupture in anterior wall of bladder; fracture of both pubic bones.

(68) Rivington, 1883; Lancet, London, 1882-83, Vols. lxxvii and lxxviii. Man; aged twenty-four years. Fall. Catheter drew eight ounces of blood and urine. Inability but continuous desire to pass urine. Swelling of scrotum. Death in four days. Autopsy: Fracture of ischium and pubis; rupture on right antero-lateral aspect of neck of bladder.

(69) Stone, 1883; *Medical News*, Philadelphia, 1883, Vol. xliii, p. 484. Man; aged twenty-one years. Crushed between cars. Wound five inches long opening abdominal cavity; closed. Catheterization three hours afterwards obtained no urine. Urine through wound. Catheter in bladder five days. Left iliac artery occluded; gangrene and amputation. Temperature, 104°-106° F. In fourteen days pus-cavity at base of bladder. Stupor for four weeks. Death from septicæmia on thirty-fifth day. Autopsy: Separation of symphysis; rupture through prostate and neck of bladder; abscess in front and to left of bladder and rectum; no peritonitis except over kidney.

(70) Alexander, 1884; *Liverpool Medico-Chirurgical Journal*, 1884, Vol. iv, p. 176. Man; aged forty-one years. Run over. Catheterization gave bloody urine. Operation: Thirty-six hours; abdominal section; rent in bladder; half filled with a spicule of bone; rupture in neck; washed with carbolic acid, and tepid water allowed to flow through the wound; epileptic fit and death on second day. Autopsy: Pubis fractured; fragment penetrating bladder; sacrum fractured; peritoneum stripped up from iliac fossa by urine; peritoneal cavity healthy.

(71) Cohn, 1884; *Bulletin de la Société anatomique de Paris*, 1884, Vol. lix, p. 146. Man; aged fifty-six years. Run over. Great pain on flexing legs. Anuria. Catheter drew few drops of blood and urine. Died in sixty-five hours. Autopsy: No peritonitis; no urine or pus in peritoneal cavity; pus and urine in muscles of abdominal wall and pelvis; symphysis separated; double fracture of sacrum; bladder contracted; two perforations behind symphysis. Rupture due to tearing apart of anterior ligament.

(72) Harrison, 1884; *Liverpool Medico-Chirurgical Journal*, 1884, Vol. iv. Man; aged twenty-nine years. Fell with a large stone on top of him. Catheterization yielded blood and urine. Vomiting, thirst, and great pain. Operation: Twenty-four hours; median perineal opening and exploration with finger in bladder; drainage through a lithotomy-tube. Died on seventh day. Autopsy: Signs of beginning peritonitis; bladder empty; laceration in anterior wall and trigone; pelvis fractured in six places.

(73) Willard, 1885; *Maryland Medical Journal*, Baltimore, 1885, Vol. xiii. Man; aged twenty-three years. Crushed under engine. Suppression of urine. No extravasation. Catheter drew blood and urine. Vomiting. Death in three days. Autopsy: Separation of symphysis, left pubis penetrating anterior wall of bladder; urine behind symphysis; blood in peritoneal cavity; no pus; fracture of ischium and separation of sacro-iliac synchondrosis.

(74) Schrady, 1886; *Medical Record*, New York, 1886, Vol. xxx, p. 441. Man. Caught between wheels. Extravasation of urine. Operation: Twenty-four hours; exploratory perineal incision. Suprapubic cystotomy; drainage-tube through bladder. Died on fifth day with progress of urine infiltration. Autopsy: Rupture of bladder on right side; urethra torn across; multiple fractures of pubes and ischium; separation of sacro-iliac synchondrosis.

(75) Briddon, 1887; *New York Medical Journal*, 1887, Vol. xlv. Man; aged thirty-three years. Stone fell on him. Shock. Bloody urine by catheter. Operation: Four and a half hours; laparotomy; sub-peritoneal cellular tissue infiltrated with blood; double fracture of pubis with splinters; peritoneum intact; rupture on anterior wall of bladder; permanent catheter and drainage through lower part of abdominal incision. Catheter removed on eleventh day. At end of seventh month a fistula still remained.

(76) Briddon, 1887; *New York Medical Journal*, 1887, Vol. xlv. Man; aged forty-two years. Struck by locomotive. Pain in region of right hip. Desire and inability to urinate; 100 cubic centimetres of bloody fluid by catheter. Triangular zone of dulness with Poupart's ligament as a base. Operation: Six hours; perineal incision; blood from bladder; tube introduced. Suprapubic incision; large cavity behind symphysis; fracture of pubis; rupture on anterior wall not involving peritoneum; Thompson's tube introduced and wound packed with gauze. Better next day, and bladder irrigated with boro salicylate solution; temperature 38.5° F. Delirious three days later. Died on sixth day. No autopsy.

(77) Mason, 1887; *Lancet*, London, 1887, Vol. i, p. 172. Man; aged thirty-six years. Crushed by wagon. Blood and urine by catheter. Emphysema over pubes. Operation: Incisions over pubes and perineum; foul gas expelled; retained catheter; chill on eighth day. Death in seventeen days. Autopsy: Fractures of pubes; right pubis pushed into right side of bladder.

(78) Robson, 1887 (*McCormac*, *British Medical Journal*, 1887, Vol. i). Man; aged sixty-eight years. Desire and inability to urinate. Operation: Three hours; membranous urethra opened and tube introduced into bladder; laparotomy, but no urine and no intraperitoneal rupture; wound closed. Died from shock in a few hours. Autopsy: Muscles and fascia above pubes infiltrated; comminuted fracture of pubes with fragment entering anterior wall of bladder.

(79) De Arx, 1888; *Correspondenzblatt für schweitzer Aerzte*, 1888, January 15. Man. Fractured pubis. Great extraperitoneal hæmorrhage. Bladder torn by fractured pubis. No external lesions. Operation: Laparotomy; drainage with permanent catheter. Death thirty-four hours after operation from shock.

(80) Bond, 1889; *Lancet*, London, 1889, August 10. Man; aged thirty-four years. Crushed by mass of falling earth. Admitted on second day. Tumefaction of scrotum and lower abdomen. Retention of urine. Bloody urine by catheter. Operation: Third day; short median abdominal incision; no intraperitoneal opening from bladder; peritoneum closed and incision extended downward to explore bladder extraperitoneally; bloody urine flowed out; bladder opened and tube passed out through perineal opening. Death from urine infiltration. Autopsy: Bladder separated at neck from urethra; fracture of ischium with fragment pushing bladder against triangular ligament; urine in pelvis; drainage perfect(?). No peritonitis.

(81) De Mollière, 1889; *Lyon Médical*, March, 1889. Man. Fall. Extravasation in lower abdomen, perineum, and thighs. Not catheterized. Operation: Twenty-four hours; deep perineal incision; evacuation of blood-clots and urine; fracture of both pubes with fragment causing rupture at base of bladder; drainage; catheter retained forty-eight hours. Recovery.

(82) Rose, 1891; *Deutsche Zeitschrift für Chirurgie*, Leipzig, 1891, Vol. xxxi, p. 347. Man; aged thirty-two years. Fall. No infiltration. Bloody fluid by catheter. Fracture of sacrum and right and left pubes. Operation: Forty-eight hours; suprapubic incision. Rupture in anterior wall; space of Retzius full of urine; peritoneum uninjured and rolled up. Pelvic cavity cleaned; drain; no sutures. For five days "the patient was dressed daily; but as this did not suffice he was every day put into a continuous bath for several hours without any dressing." After the twenty-second day the bath was used only every two or three days. Fever was only an occasional affair. Wound healed with a broad scar. Fistula remained; three months later edges freshened and excised. Recovery in six months.

(83) Imbriaco, 1892; *Gior. med. d. r. esercito*, etc., Roma, 1892, Vol. xl, p. 1441. Man. Fractured pubis with extraperitoneal laceration of bladder. Treated with hot applications and stimulants. Death in seven days.

(84) Arnheim, 1893; *Deutsche medicinische Wochenschrift*, Leipzig and Berlin, 1893, Vol. xix, p. 418. Woman; aged forty-one years. Double extraperitoneal rupture found at operation by filling the bladder with boric acid solution; caused by fragments of bone. Operation: Transverse incision above symphysis pubis; bladder wound sewed with catgut and silk; external wound packed with iodoform gauze. Patient maniacal. Death on twentieth day from hæmorrhage from rectum. Stitches held and bladder wound healed. Autopsy not allowed.

(85) , 1893, *Pesther medicinisch-chirurgische Presse*, Budapesth, 1893, Vol. xxix, p. 267. Man. Fall. Operation: Eleventh day; incision from symphysis to navel. Symphysis separated; sewed with wire. Perforation of bladder in anterior wall. Abdominal wound sewed and drained with gauze; catheter in bladder. Great sloughing of transversalis fascia. Pieces of bone came away. Well in four months.

(86) Parker, 1893; *Society of the Clinics of London*, January 27, 1893. Boy; aged nine years. Struck by car. Fracture of femur. Separation of symphysis. Rupture of bladder. Contusion of scrotum and perineum. Operation: Transverse suprapubic incision and drainage. Recovery.

(87) Beckman, 1896; Thesis, Halle, O. S., 1896. Man; aged forty-two years. Fracture of pelvis with extraperitoneal rupture of bladder. Operation: Sectio alta; suture of wound on anterior bladder wall; retained catheter. Recovery in three months.

(88) Cushing, 1896 (Original communication; not previously reported). Man; Italian; aged thirty-three years. Bank of earth fell on him. Admitted one hour after accident. Catheterization yielded a few

drops of blood. On injecting borax solution it was all returned. Catheter retained. Patient spent restless night. Next day hæmorrhage from urethra. Great thirst. Operation: Thirty-six hours after accident; suprapubic cystotomy. Extravasated blood and urine in space of Retzius; broken-down blood-clot; injection. Fracture of ramus of pubis with perforation of anterior bladder wall. Catheter retained. Daily bladder irrigations. Died on fourth day. Autopsy showed above lesions with several fractures; pyæmia; multiple abscesses.

(89) Van Moorsel, 1896; *Nederl. niel geneesk. Arch.*, etc., Leyden, 1896, Vol. xx, p. 331. Man. Run over. Great shock. Extraperitoneal rupture of bladder with separation of symphysis and fracture of pubis. Operation: Twelve centimetres incision above pubes. Cavity behind symphysis filled with bloody urine and coagula. Retained catheter in urethra; iodoform gauze drainage. Death in twenty-four hours after accident.

(90) Wiessinger, 1896; *Festschrift zur Feier der achtzig jährig Stiftungs für die ärztliche Verein zu Hamburg*, Leipzig, 1896. Man; aged twenty-six years. Six bags of rice fell on him. Operation: Twelve to twenty hours. Temperature, two days later = 39° C. Incision over fracture on seventeenth day; pus and urine behind pubes. Patient put in continuous bath. Healing of abscess on forty-second day after accident. Discharged in three months.

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(92) Stein, *Annals of Anatomy and Surgery*, Brooklyn, 1882, Vol. vi.

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(98) Sexe, *Traitement chirurgicale des Ruptures traumatiques de la Vessie*, Lyon, 1893.

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SURGICAL TREATMENT OF ACUTE RHEUMATIC ARTHRITIS.

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I FEEL diffident in calling attention to what may at first sight appear rather heroic treatment for acute rheumatism, and, before entering on such a delicate task, I think it right to state that I am fully cognizant of the enormous labors which have been bestowed on this malady by most competent medical scientists. But as my own clinical observation has led me to differ from the many theories which have been promulgated, I wish to briefly ventilate my ideas on the subject, without presuming to criticise the views which others hold dear.

In my opinion, acute rheumatism is primarily a joint affection, due to some morbid material conveyed by the blood; that this poison—be it germ, ptomaine, or ferment—gains admission to the human body through the tonsil, or through one of the many doors open to such intruders; that the joint invasion is promptly followed by a form of acute arthritis with general toxæmia, and, furthermore, the infected joints serve as incubators, where the poison is elaborated and poured into the circulation, and by this latter agency conveyed to other articulations and to the heart. And in some cases the joints retain the virus in a latent form, until some chill, etc., rouses it into activity. Holding such views, I feel it necessary to suggest that the term acute infective arthritis be substituted for acute rheumatism, the latter in reality is a vague expression, with little or no etiological or pathological significance, and the prefixes gonorrhœal, pyæmic, tuber-

cular, syphilitic, etc., may be conveniently retained in order to differentiate the arthritis peculiar to each.

The next thing to be done is to see if there are any other affections which are in any way analogous, and if so, what treatment of them is most beneficial. Gonorrhœal arthritis and pyæmia bear resemblance in many respects, and I find that the only successful treatment for a gonorrhœal or pyæmic joint is to immediately open, irrigate, and drain it. (In case that this latter statement should be questioned, I append four cases, which I think will help to justify such a conclusion.)

It is unnecessary to occupy space by detailing the advantages which would accrue from a treatment of this horrible malady, whereby its progress could be stopped and its cause possibly eliminated from the system.

Medicine has done good service; but there are few of us who have not seen many desperate cases in which salicylates, alkalis, flannel, and everything else miserably failed; and, furthermore, I maintain that it is impossible to prognosticate in any given case, at onset, whether the person will recover unscathed, be left with a damaged heart, or have an accumulation of virus left latent in the articulations, ready at any moment, on slight provocation, to flare up and endanger the existence of the individual. Therefore I have no hesitation in suggesting that recourse should be had to surgery in order to see if it is possible to more successfully combat such a treacherous disease.

In the case about to be described, not only was surgery successful, but the result clearly proved that operation was delayed too long.

B. C., aged forty-one years, clerk, was admitted to the British Hospital on June 21, 1897.

History.—Nine days before, on leaving his office, he had "caught a chill"; two hours later he had acute pain in left elbow; this was soon followed by pains in both knees, with fever, shivering, sweating, and general malaise. He remained in bed, and two days later sent for a doctor, who diagnosed rheumatic fever,

and prescribed sodæ salicyl, fifteen grains, every three hours, flannel around joints, magnesia sulphate, and fluid diet. He found his temperature was 103.4° F. and knee-joints swollen, with considerable effusion.

Past History.—Never had any serious illness; gonorrhœa fifteen years before. An alcoholic tendency.

On admission patient presented a worn-out appearance, due, as he said, to sleeplessness; his temperature was 102° F., tongue thickly coated, pulse 80, continuous sweating, urine scanty, highly colored, full of urates with a trace of albumen, anorexia, slight pain in left elbow without swelling, both knee-joints were swollen and painful, patellæ floating, with some peri-articular inflammation and slight œdema. Heart and other organs normal. Diagnosis, rheumatic fever. Treatment, sodæ salicyl, fifteen grains every three hours, joints enveloped in warm wool and flannel bandages; he was placed between blankets, and given milk diet.

A week later, as no improvement had taken place, salicin was tried, the only result being that pulse fell to 56. July 1 alkalies were substituted for the salicylates, and warm fomentations were applied to swollen knees; as the pulse was becoming very weak strychnine was injected every six hours, also mist. vini Gallici, Brand's essence, coffee, and beef-tea ordered.

July 12.—No improvement; patient decidedly losing ground; half-drachm doses of turpentine given every six hours.

July 14.—Condition worse; mist. quinine given every four hours.

July 16.—Pulse weak and compressible; fever continued; very emaciated; lay like a log in bed; lost all desire for nourishment; tongue foul; knee-joints more distended and painful; transitory twinges in left elbow; and, as he could not take food in sufficient quantity, nutrient enemæ were ordered.

I now found myself placed in a very unenviable position, for I believed that surgery would save him, but I feared that the anæsthetic might kill him. However, I decided that death on the operating-table was preferable to the slow torturing process, and on July 17 ether was administered, a two-inch incision made into right knee-joint, four ounces of greenish, turbid, flocculent serum, with many large masses of lymph, were removed; irrigation with 1 in 5000 biniodide lotion, and gauze drain inserted.

Owing to his corpse-like aspect, I shrunk from attacking the left knee. He was promptly removed to a warm bed, and antishock treatment liberally applied. On the following day the dressings were removed; drain soaked with serum; pain considerably diminished. Third day again dressed; joint quite dry; swelling had disappeared; no pain on palpation; drain left out. Sixth day, joint normal in contour; wound healing aseptically in depth. Patient felt greatly relieved on "that side." Sixteenth day wound healed, active movement through half a right angle without any pain; joint normal in appearance.

The day following operation he complained more than ever of the pain and tension in the left knee. Poultices were applied without benefit. By the sixth day all the general symptoms were as marked as heretofore; and it was evident that the only way to avoid a fatal termination was by operating at once.

July 24.—Arthrotomy; six ounces of greenish, turbid serum and many large lymph-flakes were removed, one of these masses was found becoming organized, numerous small blood-vessels having formed in it. The joint was irrigated and drained. Peri-articular thickening and cedema were very marked on this side, particularly in the popliteal space.

First day, temperature did not exceed 99° F.; pain ceased. An uneventful recovery followed; the joint rapidly resumed its normal contour, except the thickening in the popliteal space, which slowly disappeared. Fever did not return, pain ceased in elbow, tongue cleaned, appetite returned, sweating stopped, and the patient was allowed out of bed on August 10 able to partake of full diet, cod-liver oil, and iron. For some time after this he complained of stiffness in left popliteal space, caused by the thickening and cedema around tendons. Convalescence was slow, owing to the intense prostration, but he rapidly gained flesh, and was discharged cured five weeks later.

The information derived from this case was (*a*) that arthrotomy had an immediate curative effect on the arthritis of right knee; (*b*) that delay in operating on left one allowed the inflammation and cedema of surrounding structures to assume a chronic form; (*c*) that this arthritis is amenable to surgical treatment; (*d*) that the general toxæmia disappears when once the infected joints are opened, the morbid material

cleared away, and drainage provided; and (*e*) no patient, however ill, suffering from acute infective arthritis, should be permitted to die without giving him a surgical chance.

As no line of treatment is worth much without a plan, I wish to suggest a few working principles.

Operate as soon as possible after the disease has declared itself (by causing swelling or effusion in a joint); do not wait for other joints or for the heart to confirm the diagnosis; if operation is to be curative, as in pyæmia, the sooner done the better.

When more than one joint is found affected, operation should be at once undertaken, even if the heart has been already attacked. No good can come from allowing the infected joints to continue as incubators for the virus, for our object ought to be to save the endocardium from further destruction, to protect the non-infected joints, and, if possible, eliminate the poison from the system, as well as cure the infected joints themselves.

Acute Epiphysitis; Pyæmia; Operation; Recovery.—A. S., aged five and a half years, entered hospital on May 4, 1897.

History.—Very healthy until the 23d of March last, when he suddenly complained of severe pain at lower end of tibia, accompanied by fever and shivering. On the following day his father observed some swelling in the same region, and immediately sought medical skill. Poultices were ordered, and kept going night and day until April 1. Fever, rigors, and sweats continued; the swelling had extended upward to middle of leg and downward into ankle-joint; a small incision was made on each side of tumefaction, and a teaspoonful of matter removed. Constitutional symptoms continued getting worse, and on April 10 a fluctuating swelling suddenly appeared on chest, to inner side of right nipple; an incision was made into it, pus evacuated, and it healed. On April 14 pain was complained of in right elbow, it rapidly became swollen, and poultices were applied to it until April 23. A consultation was now held, chloroform administered, and an incision made to inner side of olecranon; "nothing found"; also a five-inch incision was made in site of former cut over tibia, but no purulent collection was encountered. The

bone was found bare, and the operator drew the father's attention to the "hard ring caused by the probe touching the bone." This, the surgeon said, was "a good sign."

April 25.—Some pus was seen exuding from the ankle and elbow. The father lost confidence in the local practitioner, and determined to run the risk of bringing his son, some 400 miles by train, to the British Hospital.

Condition on admission (May 4): Emaciation, tongue furred and dry, pulse 120, temperature 104° F., respirations 30, clammy sweat, anorexia, intense pain complained of in left leg and right elbow. The leg was enormously swollen from below ankle to knee (evidently the latter joint was not involved, as passive movement was permitted), two unhealthy pouting wounds were seen, covered with profuse pale granulations, and bathed in pus. The whole leg looked like a mass of dirty brawn.

The right elbow was swollen and fluctuating, with a nasty, suppurating, everted wound on inner side.

Chloroform was at once administered, and I made an incision commencing at insertion of patellar ligament and ending in the ankle-joint. The whole tibia was found bare and necrosed; little or no pus was so far met with. I then opened up the medullary cavity and found a tube of pus extending from ankle-joint to upper epiphysis of tibia; with a gouge the whole cavity was exposed, and a large gutter made; finally, the business was finished with a Volkmann's spoon; only a thin narrow strip of posterior border of tibia remained. This enormous wound was swabbed with liniment of iodine and plugged with iodoform gauze. The ankle-joint was also opened up, scraped, swabbed with iodine, and packed with gauze.

The elbow was then attacked by an anterior and posterior incision; joint found full of pus; as no dead bone was felt I resolved to make an attempt to save it; all visible pus was cleared out, the interior swabbed with iodine, irrigated with 1 in 1000 biniodide lotion, and a large drainage-tube inserted through the joint.

First day: Elbow dressed; slight purulent discharge; temperature normal.

Third day: A sudden rise in temperature to 104° F.; sweats; elbow found more swollen and purulent; leg and ankle wounds healthy.

Sixth day: Tongue again becoming dry, fever, rigors, and sweats continuing, and, notwithstanding frequent irrigation, etc., amputation had to be performed on May 10, through the middle third of the humerus. Suppuration followed in stump, flaps sloughed, necessitating the removal of another two inches of bone on June 8. Union followed by first intention.

The leg and ankle wounds filled in, I may say aseptically, and the patient was discharged cured on June 21, with good movement in ankle-joint, wound healed. All that remained of the leg wound was a healthy granulating surface, two inches in width and seven inches in length, level with skin.

Six weeks later he was brought to hospital for inspection. The wound looked excellent, and his father stated that the boy had gained seven kilos in weight since date of discharge. As far as could be judged by palpation his tibia had reformed.

Gonorrhœal Arthritis; Operation; Recovery.—S. A., cattleman, aged thirty-four years, was admitted to hospital on March 20, 1897.

History.—In 1882 he suffered from gonorrhœa, with accompanying arthritis of both knee-joints; he was unable to walk for some months. In 1894 he contracted a fresh attack of gonorrhœa; both knees were again attacked; this time "he was crippled for eighteen months."

On February 28, 1897, he received his third infection; ten days later his left knee became painful, swollen, and stiff; he also had occasional pains in left shoulder. As his knee was gradually getting worse, he entered hospital on above date.

On admission he suffered from a profuse gonorrhœa, with transitory pain in left shoulder; the left knee was found distended, painful, and partially flexed; the slightest attempt at movement caused him excruciating agony; the patella was floating, and circumference of joint was one and a half inches more than that of its fellow. General condition normal.

Gonorrhœal arthritis having been diagnosed, the joint was first blistered, then put up in a Scott's dressing, and lastly the limb was placed in a long Macintyre splint; potassium iodide and santal oil given internally, and urethral injections of chlorate of zinc administered every four hours.

Three days later he complained very much of pain, the Scott's dressing and splint were removed for inspection, and as

the condition was found in no way improved, arthrotomy was performed on March 24. About four ounces of greenish, flocculent serum was removed. On digital examination numerous large flakes of lymph were detached by the finger, and removed by irrigation with 1 in 5000 biniodide lotion, and gauze drain inserted. Pain immediately disappeared; no constitutional symptoms followed. Primary dressing removed on third day; joint quite dry, painless to touch, and normal in contour; drain dispensed with.

March 30.—Wound healing in depth; he painlessly flexed his knee through right angle.

April 10.—Full range of movement restored; joint normal; allowed out of bed.

A few days later he developed a sharp attack of dysentery, which confined him to bed until May 4. As the gonorrhœa still continued, he was kept in hospital until May 21, when he was discharged completely cured of his various troubles.

Gonorrhœal Arthritis; Operation; Recovery.—C. N., aged thirty years, contracted gonorrhœa eight months prior to admission, and, as no proper treatment was adopted, the discharge continued all this time. On March 14 he complained of pain in right knee, and two days later the joint became swollen and stiff. He was admitted to hospital on March 19, suffering from a purulent urethral discharge, with right knee-joint painful and swollen (patella floating), the leg was slightly flexed, and movement was impossible owing to pain caused on attempting the same. Aspiration was performed, and two ounces of greenish, turbid serum removed. Blisters and Scott's dressing with splint were afterwards applied, and the same medication adopted as in previous case.

April 11.—Little or no swelling visible, but the joint remained stiff. Massage ordered to be done twice a day. Gonorrhœa ceased.

June 1.—Movement slowly returning; walked with a decided limp. He was sent to Convalescent Home, and told to massage knee every day. Syrupus ferri iodidi given internally. Three days later he was sent back to hospital, because the pain had returned and the joint had become slightly swollen. On readmission some thickening was observed to outer side of patella.

June 13.—Arthrotomy; one ounce of serum, mixed with

synovial fluid, evacuated, and a piece of thickened synovial membrane snipped with a scissors and removed; irrigation, and gauze drain inserted.

June 16.—Dressed; joint quite dry, and normal in contour.

June 23.—Splint removed; active movement through a right angle.

June 26.—Allowed out of bed; walked with a slight limp; active movement increased.

July 12.—Discharged cured, with normal range of motion; no stiffness, pain, or swelling.

July 30.—Reported "that the knee was as strong as ever."

Gonorrhœal Arthritis; Operation; Recovery.—A. R., aged twenty-seven years, clerk, admitted on July 21, 1897.

History.—Had two previous attacks of gonorrhœa, one in 1892, and the other 1894. On July 1 he acquired the disease for a third time, and tried to cure it by remaining in bed for a week. The day after getting up he felt pain in left knee; two days later the joint became swollen and slightly stiff. As these symptoms became more aggravated, and gonorrhœa reappeared, he entered the hospital on above date.

On admission the right knee was found greatly distended with fluid, slightly flexed, muscles very rigid, little or no pain, except when movement was attempted; a profuse gonorrhœa was present.

Blisters, Scott's dressing, and splint were applied, potassium iodide and santal oil given internally, and urethral injections ordered every four hours.

July 25.—No diminution in swelling or rigidity.

July 26.—Arthrotomy; five ounces of serum evacuated; irrigation and drainage as in other cases.

July 29.—Dressed. Joint normal in contour, active motion through half a right angle.

July 31.—Drain left out.

August 3.—Allowed out of bed; active movement through a right angle.

August 13.—Normal movement restored; could walk and run without a limp.

August 14.—Discharged cured.

In conclusion, I wish to mention a few details in the

method of operation. The incision must be large enough to admit the index-finger for lymph coagula fasten in the recesses of joints, and I have frequently noted that nothing short of digital shifting suffices to detach them. It is needless to say, if such plastic stuff should be left behind, the operation would be robbed of half its value.

Irrigation should be always carried out; without it, the toilet of the joint would be incomplete; my favorite injection being biniodide of mercury lotion 1 in 5000. Care must be taken to leave the joint cavity dry; nothing effects this better than a long roll of gauze, this can be packed in, in all directions, twisted about, and when removed many flocculi will be seen attached to it. Last and by no means least, drainage must be provided for: my experience has taught me not to open a joint for any form of effusion unless I am prepared to drain it; the rest and relief of tension, as afforded by a few strands of gauze, are absolutely necessary in order to insure a good result.

It may not be considered extraneous to the subject of this paper if I mention that in our most recent text-books of surgery gonorrhœal arthritis is described as "a disease that commonly ends by stiffening the joints" (Treves); "the disease terminates in resolution, in ankylosis, or in destruction of the joint, most frequently by far in ankylosis (fibrous), either partial or complete, due to organization of the plastic exudation, both articular and periarticular" (Keen and White); and, furthermore, "unfortunately there is no remedy yet known which can be relied on" (Treves).

I am not surprised that the recognized indolent treatment of this affection gives such bad results, for it is absurd to suppose that blistering or rubbing can cure an infective arthritis.

The fact of the matter is this: when we meet with a decoction of staphylococci we rush to operate; but when we encounter a decoction of gonococci or rheumacocci we nostrumize, because we entertain some fears of merely opening and draining a non-purulent joint.

BRANCHIAL CARCINOMA.

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IN the autumn of 1891 the following case¹ came under my observation. A lady of forty-eight years presented herself with a hard, rather diffuse swelling at the right side of the neck. The mass had been growing slowly for something over a year, was about the size of a pigeon's egg, irregular, deeply seated beneath the angle of the jaw, and stretching backward to and beneath the sterno-mastoid muscle. The tumor was partially fixed, was not painful, and but slightly tender. The skin over it was not involved. Careful examination of the ear, nose, mouth, pharynx, and œsophagus revealed nothing abnormal.

Operation.—By an incision of appropriate length the tumor was reached. It was found to be without a capsule and to be adherent to the surrounding structures. It was dissected out, and with it was removed a liberal area from the adjacent tissues. Neither of the important vessels or nerves was wounded. Closure of wound; prompt healing.

The tumor was solid; its cut surface was grayish and firm; it presented the gross appearance of a malignant growth. It was sent to Dr. F. Ferguson, pathologist to the New York Hospital, who pronounced it carcinoma.

A year later an enlarged gland, the size of a hazel-nut, was removed from the region of the scar. It also was pronounced carcinoma by the pathologist. The patient has been seen at frequent intervals since, but no further enlargement has been discovered. At this time, six years after the primary operation and five years after the removal of the recurrent lump, she is apparently free from relapse and may be reported as probably cured. The original growth may be looked upon as a branchiogenous carcinoma.

¹ From the practice of Dr. William T. Bull, New York City, who kindly permits this publication.

Our first knowledge of these tumors was furnished by Richard von Volkmann in 1882 (*Das tiefe branchiogene Hals Karzinom, Centralblatt für Chirurgie*, Band ix, S. 49), who had observed three cases of neck carcinoma, in which there was no original growth in the skin or in the mucous membrane of the nose, mouth, pharynx, larynx, œsophagus, or ear, and which did not originate in the lymphatic glands. The patients were men between forty and fifty years of age. The tumors varied in size from a plum to a child's fist. In two of these cases the consistency was hard; in the third instance there was a mucoid degeneration. In the latter case the tumor was of large size. In each instance the tumor, together with the surrounding structures, was removed and found to be carcinoma. Von Volkmann says that these undoubtedly originated from epithelium left behind in the closure of the branchial clefts, and he therefore terms them "branchiogenic carcinomata."

Other instances of these tumors, which, with the kind assistance of Dr. George R. White, of New York, I have been able to gather from literature, are as follows:

CASE I.—Santer¹ removed, in June, 1886, a malignant cystadenoma from above the clavicle of a man. In November of the same year there was local recurrence, and one month later the patient died of a large tumor involving the ileum and its mesentery. Santer believed the original growth to have been of branchial origin.

CASE II.—R. Treves.² The author removed from a man of fifty-three years a tumor of the neck two inches below the left ear. The growth had been present two months. The patient died of exhaustion three months later. Microscopic examination showed a typical carcinoma.

CASE III.—In 1885, Treves³ removed from the right side of the neck of a woman, of fifty-two years, a large tumor which was cystic in one-third of its extent, the remainder being solid. The microscopic evidences corresponded to those in the preceding case.

CASE IV.—Regnault.⁴ Operation by Langenbeck. Tumor of nine months' growth, in the neck of a patient of sixty-five

years. Jugular and carotid involved. Thorough extirpation; death from exhaustion at end of forty-eight hours. "Carcinoma branchiogenic."

CASE V⁵.—Operation by Czerny. Tumor of three months' growth, at division of carotid artery on the right side of the neck. The tumor was scraped out. "It presented the characteristics of a branchiogenic carcinoma of Volkmann."

CASE VI.—Silcock.⁶ A man of thirty-six years presented a tumor of three months' growth under the lower third of the left sterno-mastoid muscle. Operation by Owen. Death. Microscopic examination showed a large cyst with papillary granulations consisting of epithelial cells, which formed nests and long columns.

CASE VII⁷.—Cystic tumor on the right side of the neck of a man of fifty-six years. The tumor was incised by Mr. Pepper. The macroscopic and microscopic evidences were the same as in the preceding case.

CASE VIII.—Richard.⁸ Man of fifty-seven years. Tumor of one year's growth under the right angle of the jaw; this had broken down several weeks previously. Complete extirpation was impossible. Microscopic examination showed the mass to be a typical carcinoma. (This case and the following two are from the clinic of Professor Bruns, in Tübingen.)

CASE IX⁹.—Man of sixty-two years. Rapidly growing tumor of five months' duration near angle of jaw on right side of neck. Extirpation. The growth was partly cystic and partly solid, and was found to be a carcinoma on microscopic examination.

CASE X¹⁰.—A patient of forty-three years had suffered with a cyst of the neck since childhood. Two years previous this cyst had been incised, but the incision had never healed. Nine months before operation the tissue about the sinus had begun to grow, and had formed a hard tumor the size of a fist. The sinus had not healed, the skin and mucous membrane were not affected. Extirpation. Recovery. Microscopic examination showed carcinoma resembling skin-cancer, with numerous cell-nests.

CASE XI.—Gussenbauer.¹¹ Male, aged sixty years. During the past nine months the patient had noticed a hard tumor at the edge of the sterno-mastoid, at the junction of its upper and

middle thirds. The mass was movable on the deep structures of the neck. Nothing abnormal was found in the throat or on the skin. Extirpation. Death from recurrence ten weeks later. Microscopic examination showed a flat-celled carcinoma with many large columns of cells (zellensträngen) and cell-nests. The adjacent lymphatic glands showed the same structure.

CASE XII¹².—Male, aged forty-four years. Eight months previous to being seen the patient had noticed in the right side of the neck a lump the size of a nut. This had grown to the size of an egg. It was attached to the sterno-mastoid, but movable on the deeper structures. Extirpation. "Epithelial carcinoma."

CASE XIII¹³.—Male, aged fifty years. Tumor of three months' growth, the size of an apple, hard and irregular, projecting into the pharynx, but not involving the mucous membrane. Extirpation. Death from œdema of the lungs two days later. "Branchiogenous carcinoma."

CASE XIV¹⁴.—Male, aged forty-seven years. In this instance a tumor beneath the angle of the jaw on the left side of the neck grew in four months to the size of a child's head. Hard and fixed. Extirpation of the growth, including six centimetres of the vagus nerve, the latter procedure being attended by no symptoms. "Carcinoma."

CASE XV¹⁵.—Male, aged sixty-five years. Tumor in neck, the size of a goose-egg. Extirpated, together with ten centimetres of vagus. No symptoms following nerve resection. "Carcinoma."

CASE XVI¹⁶.—Male, aged forty-eight years. Tumor in left submaxillary region. Extirpation. "Flat-celled epithelial carcinoma."

CASE XVII¹⁷.—Male, aged fifty-three years. Tumor size of a fist under the angle of the jaw. Extirpation. "Fibrous, flat-celled carcinoma."

CASE XVIII.—Reverdin and Mayor.¹⁸ A patient of sixty years presented a large tumor of rapid growth in the right side of the neck. Hard at the periphery but fluctuating in the centre. Firmly attached to the deeper structures. Operation, death from recurrence at the end of three months. "Flat-celled epithelioma."

CASE XIX.—Hektoen.¹⁹ Male, aged forty years. Tumor under left sterno-mastoid; movable; the skin and mucous mem-

brane normal. Partial extirpation. "Squamous-celled carcinoma."

CASE XX.—Eigenbrodt.²⁰ Male, aged sixty-two years. Tumor of neck. Extirpation. "Branchial carcinoma." No recurrence at end of two years. In this operation a portion of the vagus was resected, and for some time after this there was a quickening and irregularity of the pulse, together with paralysis of one vocal cord. Pressure over a certain portion of the scar excited an irresistible attack of coughing.

When we study the origin and growth of these tumors we find the task a simple one. They are to be classed with the teratomata; their origin is from the inclusion epithelium left during the imperfect closure of a branchial cleft. This epithelium may be from the skin or from the mucous membrane of the pharynx. So, from this non-closure of one of the clefts we may have a branchial fistula, or from a proliferation of the contents a branchial cyst, while the epithelial growth may invade the tissues and result in an epithelioma of ordinary histological structure. The tumor-matrix is congenitally displaced epithelial tissue, and this epithelium may proliferate just as may epithelium elsewhere. The cells of the growth are of the flat variety.

It is not probable that accurate diagnosis can be arrived at in many of these tumors before they are removed and histologically examined. The diagnosis must rest on this: that an epithelioma of the neck which does not involve the skin or mucous membrane, and in which no original focus can be found in these structures, is to be looked upon as a branchiogenic carcinoma, and in our clinical examination of deep cervical tumors it is well for us to bear in mind the possibility of their being of this nature. At the meeting of the French Surgical Congress, in October, 1897, Berger (*Gazette Médicale de Paris*, October 23, 1897) called attention to the fact that outlying accessory thyroid glands may take on a malignant growth, and that these are to be differentiated histologically from the branchial tumors of von Volkmann.

Analysis of the reported cases is not of especial interest.

We may note, however, that of twenty of the cases in which the sex is noted eighteen were in men and but two in women. One of the patients was thirty-six years of age, all of the others in which the age was reported were over forty. Three of the patients died as a direct result of the operation, four died of recurrence from one to four months afterwards. The fate of the others is unknown, with the exception of Eigenbrodt's patient, who was free from recurrence two years after operation, and the case reported by me, which is well six years after the removal of the original growth.

In the consideration of any form of malignancy cases in which the end result is unknown are robbed of much that is of interest. In forming provisional prognosis in the class of tumors under consideration we are to take cognizance of their deep situation, the glandular nature of the region, and the difficulties attending thorough extirpation. It is probable that only those attacked early can be cured, and the rapidity of growth in many of the cases cited in the foregoing pages renders this of especial importance. It is needless to say that the management must rest upon early and thorough extirpation, and careful observation of the patient during the remainder of life.

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- ¹ Virchow's Archives, Band cxii.
- ² Transactions of the London Pathological Society, 1887, Vol. xxxviii, p. 361.
- ³ Ibid. ⁴ Archiv für klinische Chirurgie, Band xxxv, S. 50.
- ⁵ Ibid. ⁶ British Medical Journal, 1887, Vol. i, p. 620.
- ⁷ Ibid. ⁸ Beiträge zur klinische Chirurgie, Band iii, S. 165.
- ⁹ Ibid. ¹⁰ Ibid.
- ¹¹ Festschrift gewidmet Th. Billroth, Stuttgart, 1892, S. 273.
- ¹² Ibid. ¹³ Ibid. ¹⁴ Ibid. ¹⁵ Ibid. ¹⁶ Ibid. ¹⁷ Ibid.
- ¹⁸ Revue Médicale de la suisse Romande, Vol. viii, 1888.
- ¹⁹ North American Practitioner, Vol. ii, 1890.
- ²⁰ Verhandlung der Deutschen Gesellschaft für Chirurgie, 1894.

REPORT OF A CASE OF EPITHELIOMA OF THE
SKIN OF THE FACE, WITH UNUSUAL
COURSE OF INFECTION OF
LYMPH-NODES.¹

BY DOUGLASS W. MONTGOMERY, M.D.,

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PROFESSOR OF DISEASES OF THE SKIN, MEDICAL DEPARTMENT OF THE UNIVERSITY
OF CALIFORNIA.

THE following case is noteworthy because of the comparatively early involvement of the lymphatic ganglia. Such complications usually take place very late in the course of epithelioma of the skin, when the local disease has already assumed large proportions. More interesting still than the early metastasis, however, was the erratic course that the metastasis took. Lymphatic nodules were affected that usually remain entirely free. For instance, on looking at Sappey's plate of the lymphatic vessels of the face (Fig. 1) one can hardly imagine how the affected ganglia in the case in question became involved, while others apparently more directly in the lymph-stream escaped.

On March 22, 1892, a woman, fifty-six years of age, consulted me at the request of Dr. W. W. Kerr on account of an ulcer presenting the usual characteristics of epithelioma of the skin. It was superficial, easily movable on the subjacent structures, about a centimetre in its largest diameter, and was situated on the dorsum and on the right side of the nose far up near the eye. There was, however, a good margin of sound skin between the inner corner of the eye and the edge of the ulcer. The floor of the ulcer was light red, uneven, and bled easily, and its upper edge was rolled and hard. A microscopic section of the floor

¹ Read before the California Academy of Medicine, November 20, 1897.

of the ulcer is shown in Fig. 2. The patient said that the affection had originally appeared about six years before as a raw, easily bleeding surface, and that a doctor near the place she was living had excised it. It had remained well until the previous winter, when there again appeared a painless sore. She then

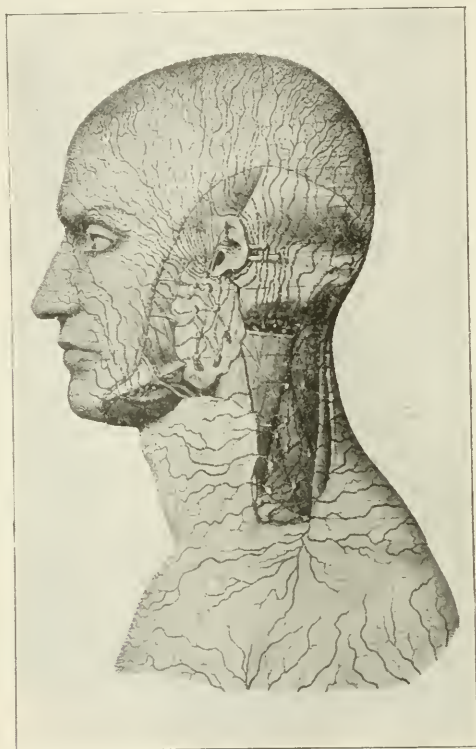


FIG. 1.—Photograph of plate in Sappey's atlas, showing the lymphatic vessels and ganglia of the face and head. It can be seen that the lymph streams from the upper part of the nose and corner of the eye run to the ganglia under the middle and posterior part of the body of the lower jaw.

proceeded to give the usual history of the lesion apparently almost healing and afterwards breaking down again. The patient's skin was senile, but she enjoyed good general health. No enlargements whatever of the lymphatic ganglia of the face or neck were found.

The outlook for a wide operation seemed entirely favorable, and a few days after seeing the patient the growth, with the kind assistance of Dr. H. M. Sherman, was liberally removed, and the defect closed by a flap taken from the forehead.

In June, 1894, the patient again came to the office complaining of a drooping of the right lower eyelid. Everything at the seat of the original trouble was in perfect condition. Then I fell to examining the complained-of lower lid. This was slightly everted and entirely paralyzed, and she rolled the eyelid up under the upper lid in the characteristic way. The wrinkles of the right side of the forehead were smoothed out, showing a paralysis of these muscles also. There was no paralysis of the lower part of the face.

There was a hard, immovable, painless tumor lying in front of the right ear over the parotid gland. The skin was firmly adherent over this tumor, and it evidently was one of several¹ of the preauricular lymphatic nodules deeply involved by epitheliomatous infiltration. This infiltration had long ago burst through the capsules of the ganglia, and had involved those fibres of the pes anserinus of the seventh nerve that are distributed to the upper part of the face. The patient also complained of occasional neuralgia of the right side of the face, accompanied by swelling of the cheek.

My attention was then drawn to a pigeon-egg sized lump under the chin, which was smooth, firm, painless, and attached to the floor of the mouth, but not adherent to the skin. This was evidently a metastasis into one of the submental lymphatic nodules. Just posterior to this lump there were two other enlarged lymphatic nodules, each about the size of a pea. They were evidently just commencing to be infiltrated, and were yet freely movable.²

¹ Sappey says there are from twelve to fifteen of the superficial parotid lymphatic ganglia, and that they are situated either under the fibrous aponeurosis that covers the parotid gland, or in between the lobules of the gland. *Anatomie, Physiologie, et Pathologie des Vaisseaux lymphatiques.* Par Ph. C. Sappey.

² It is interesting to note in connection with this case what Sappey has to say (*vide supra*) of these submental lymphatic nodules. He says that there are usually three of them; sometimes, however, two, and very rarely only one. The one situated most anteriorly lies directly in the median line, and the two others to the right and left and posteriorly. It was clearly these three nodules that were affected in the case herewith reported.

The case was hopeless, for if all these nodules were demonstrably implicated, many others were undoubtedly already infected, and one could not remove the whole side of the face and neck.

Five months after this, on December 18, 1894, the patient again came to the office. Now cachexia was well marked, the paralysis of the right side of the face was complete, and the ectropion was extreme. The tumor over the parotid gland had shrunk considerably, and the skin over it was deeply furrowed and puckered. There was a cup-shaped ulcer with a red granulating surface on the apex of the largest tumor under the chin, and the whole of the floor of the mouth was involved. There never was, however, at any time any ulceration of the lips or



FIG. 2.—Section through the middle of the epithelioma in question.
(Drawn by Dr. I. Katsuki.)

mouth, nasal cavities, or pharynx, so that the cancerous affection of the lymphatic ganglia must have originated in the above-described epithelioma of the face. There was no pain complained of during this visit, but when she called again, on April 6, 1895, the pain was atrocious both in front of the ear and under the chin.

Shortly after this last visit she went to an irregular practitioner, and died in September, 1895, three years and a half after being operated upon. There never was an outbreak at the site of the operation, and the cancer in this situation was undoubtedly cured. In saying that the cancer was cured at its original site, it is simply meant that this particular cancer was eradicated, not that the tendency to form cancer there was corrected. Tissue-growth tendencies are not corrected by surgical operations.

In looking back over the case, it is not clear that anything could have been done to avert the unfortunate result. In the first place, one does not remove lymphatic nodules in operating on small cancers of the skin, because it is very rare, indeed, for such tumors to form metastases until the disease is very far advanced, or unless it has affected by contiguity some of the mucous membranes, such as the conjunctiva or the red portion of the lip. When, however, a cancer of the skin does invade an adjoining mucous membrane, it then frequently shows the same tendency to form metastases as a cancer originally beginning in the mucous membranes. There certainly was no invasion of the conjunctiva in the case under consideration. One therefore would not anticipate any affection of the lymphatic system. But supposing it had been determined to operate on the lymphatic system, then one would naturally have hit on the nodules under the body of the lower jaw back near the angle. That is to say, one would have removed ganglia that never became affected in this case. Furthermore, one must bear in mind that when lymphatic nodules are enucleated, logically all the subcutaneous fat and connective tissue between the cancer and those nodules ought to be removed also, which in this instance would have been a very extensive undertaking, and not justifiable from what we know of the tardiness of metastasis in the kind of cancer of the skin under consideration. Then, again, let us reflect that lymphatic nodules that are not demonstrably enlarged are among the most difficult structures to find in gross anatomy. After all these considerations it does not appear that it would have been judicious to have done a more extensive operation than was done.

The mode of operating would be criticised by some authorities. At the International Congress for Dermatology and Syphilis, held in London in August, 1896, M. E. Gaucher said that all treatments for epithelioma that might cause epitheliomatous grafts or emboli should be rejected (abstract of *Transactions in Annales de Dermatologie et de Syphiligraphie*, Vol. vii, p. 1210, 1896). In the case in question the epi-

thelioma was cut out and then the base scraped with a sharp curette, and both procedures come within the meaning of M. E. Gaucher's criticism, as he said that both cutting and curetting by opening the vessels favor local recurrences and metastases. He maintained that cauterization was the only method devoid of danger. Allowing with Gaucher that in an autoinoculable disease like cancer there may theoretically be some danger in a cutting or curetting operation, yet that danger would seem to be very remote, and if grafting should occur it would seem much more likely to give rise to local recurrence than to metastasis. On the other hand, in the present case, a cauterization carried so dangerously near the eye and lachrymal duct would have been a matter for serious reflection.

A CASE OF FLOATING GALL-BLADDER AND KIDNEY COMPLICATED BY CHOLELITHI- ASIS WITH PERFORATION OF THE GALL-BLADDER.

BY A. V. WENDEL, M.D.,

OF NEWARK, N. J.,

SURGEON TO THE ALEXIAN HOSPITAL.

THE patient, a woman, twenty-three years of age, consulted the writer ostensibly for a gynæcic disorder in November, 1895. She declared her health to have been excellent prior to her only confinement, which had occurred two months previous. During the previous four weeks constipation, pelvic distress, and some leucorrhœal discharge had caused her sufficient annoyance to induce her to apply for relief. She appeared of medium complexion without abnormal coloration, spare stature, and evinced a timid disposition. The organs of respiration and circulation were found normal. Hepatic and splenic dulness of the normal dimensions. Abdominal palpation detected an extremely mobile ovoidal tumor in the upper portion of the mesogastric and left lumbar regions (Fig. 1, 1), about five inches in length and three inches in breadth. The cystic nature of the tumor could be determined with distinctness, but it presented more resistance than should be expected; it was not painful. A pedicle could not be satisfactorily defined, because the sensitive state of the skin caused the patient to maintain considerable muscular rigidity of the abdominal wall. The right kidney was very loose; it could be moved as far as the umbilicus. The uterus was slightly enlarged, tender, and discharging thick mucus from the external os. No connection between the cyst and the pelvic contents could be detected. Examination under anæsthesia refused.

At each subsequent visit the tumor was found in some different locality, for instance, December 4, the cyst and kidney

were in apposition, below the umbilicus; on December 20, the cyst was found in the lower part of the right lumbar and the kidney in the mesogastric region. The uterine disorder disappeared after some months, the patient declared herself well, and continued her household duties until September 20, 1896. In the evening of that day she was suddenly seized with severe pain in the right iliac region, faintness, vomiting, high fever, and abdominal distention.

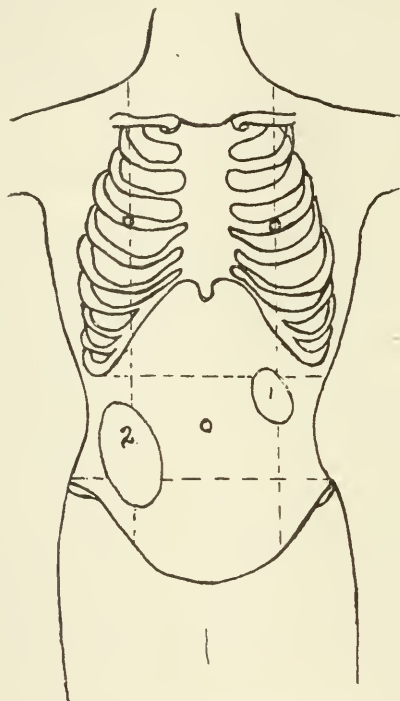


FIG. 1.—Floating gall-bladder.

1 First position of cyst; 2 Position at operation.

The writer being absent at the time, a neighboring practitioner saw the case, diagnosed it as a perforative appendicitis, and advised operation, but the patient objected, and symptomatic treatment was instituted. The temperature gradually fell from 104° to 102.5° F. towards the end of the first week, and continued to fall slowly, until after three weeks the thermometer registered normal in the morning and about 99° in the evening.

We then saw the patient again; the cyst could not be found; there was a fixed, resistant, painful swelling occupying the position shown in Fig. 1, 2, distinctly bulging the parietal wall of the abdomen. Operation was again refused. The patient soon got up and went about her affairs. In the early part of March she returned, stating herself two months pregnant, also complaining very much of distress in the side.

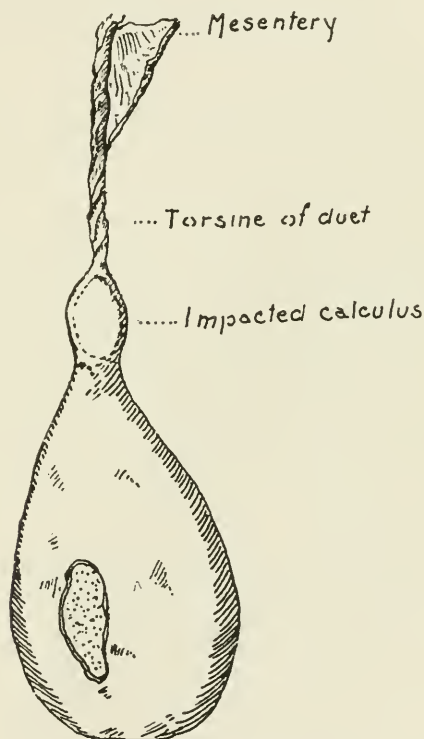


FIG. 2.—Attachments of floating gall-bladder (half size).

March 25, 1897.—Operation at the writer's private hospital. Incision in the semilunar line over the most prominent part of the swelling. As the knife penetrated the thickened peritoneum pus welled up freely, the opening was enlarged and several ounces of stinking pus and several gall-stones were evacuated. The finger defined an abscess-cavity communicating with the gall-bladder, which had a perforation about one inch in length and one-half inch in breadth on the postero-external aspect of

its body. The viscus was filled with gall-stones. The gall-bladder was loosened from the adhesions, a portion of the adherent omentum tied off and removed. The cystic duct was found to be about one-eighth of an inch in diameter, three and a quarter inches in length from the anterior border of the liver to the neck, and very much twisted. The peritoneal investment of the duct presented a mesenteric development about two inches in length, which was attached to the inferior surface of the liver. The neck of the gall-bladder was obstructed by the largest of the concretions. (Fig. 2.)

The duct was divided at the anterior border of the liver, inverted, closed with a fine catgut suture; the peritoneum was finally closed over the stump. The sac contained 213 gall-stones.

Inspection of the field now disclosed the kidney located internal to the position lately occupied by the gall-bladder, its dorsum rotated to the front and adherent to the anterior surface of the ascending colon. The bowel was dissected off, the kidney found completely enveloped as far as the hilum by the peritoneum, which was posteriorly reflected to the spinal column. The colon was also completely invested and the mesocolon markedly developed. The kidney was placed in its proper position, gauze inserted for drainage, and the abdominal incision reduced by sutures.

Convalescence was interrupted only by the expulsion of the uterine contents on the eleventh day after the operation. Four weeks later the wound had entirely healed; the kidney was found firmly fixed. She has remained well up to the present.

We have carefully searched the literature, but cannot find a parallel case, and feel impelled to report it because it presents the following interesting features:

(1) The anomalous length of the cystic duct which permitted the extreme mobility and migration.

(2) The extreme torsion of the duct without the super-vention of gangrene of the gall-bladder.

(3) The absence of discomfort until infective inflammation occurred in the gall-bladder.

(4) The complication of a rare pathological condition,—a true floating kidney.

REPORT OF A CASE OF CHOLEDOCHOCYSTOTOMY.

BY CHARLES H. DIXON, M.D.,

OF ST. LOUIS, MO.

THE case which is herewith reported shows well the condition caused by the peculiar ball-valve action of a calculus in the ducts, which Fenger called attention to in his recent article on gall-stones (*a*). "It causes intermittent attacks of retention of bile and icterus when the stone is lodged immediately above the duodenal opening of the common duct; (*b*) it causes atrophy and shrinkage of the gall-bladder when the stone is lodged in or immediately below the cyst duct."

The vertical incision was made in place of the transverse, as the former gives more room, which is of the greatest import when one has in view a choledochotomy, especially with suturing of the walls of the duct.

Mrs. D. E. F., aged forty-two years, mother of thirteen children, the two last died at about two months. Last child born March, 1897. Complained first, fourteen years ago, of cramps in the bowels and pain in region of umbilicus. Had one or two attacks a year ago, at first preceded with constipation and followed with jaundice. Attacks have gradually increased in frequency and severity.

First saw her in February, 1895, when she was suffering from a severe attack of biliary colic, accompanied with slight jaundice. The symptoms disappeared under treatment. There was no swelling appreciable in the region of the gall-bladder, although she was tender over the whole abdomen. She was then in about the seventh month of gestation. In April, 1897, she had one or two spells of colic for a week, each one followed by a chill and some fever. On June 14 she took to her bed, and would have one hard and one or two slight attacks a week. On

June 24 found her greatly jaundiced and a swelling in region of gall-bladder, bowels constipated, and abdomen tender, especially in right hypogastric region; urine dark; inability to lie on left side; some fever. Pain so severe that opiates were necessary. She remained in about the same condition till July 16, gradually losing strength, when she again began to improve,—jaundice lessened, tenderness decreased, but swelling remained about the same. August 12 had a severe colic, followed by chill and fever, temperature 105° F., abdomen tympanitic and exceedingly tender, more so over region of swelling; jaundice rapidly increased, and she required large doses of morphine to allay the pain. This condition lasted one week, when her symptoms began to lessen; but her general condition was worse, more emaciated, and weaker. The swelling somewhat less. August 26 she became delirious, and remained so more or less till September 6, the date of operation. Since then she has been very delirious, except a slight improvement September 8, when the temperature first became normal. She would take no nourishment, refused all liquids, and was getting over a grain of morphine daily hypodermically. Jaundice decreased right after the operation. She was fed through a tube till September 27. Stitches removed in one week and wound healed, except one point, through which a thread came away four weeks after the operation, when the track healed, and has remained so. Her temperature was 103° F. at time of operation, and kept between 103° and 99° for ten days; for two days it was between 96° and 97.5° . Her pulse ranged between 90 and 130 and at times quite weak. (Reported by Dr. S. L. Mitchell.)

September 6.—Found patient very much emaciated, semi-delirious; temperature 103° F.; pulse weak, quick, and intermittent; considerable jaundice; abdomen flat and no tenderness, except in the region of the gall-bladder; liver not enlarged, nor could any enlargement be detected in the region of the bladder. Urine contained bile, but no albumen or casts. Incision was made from the tenth rib downward for about four inches. On getting into the cavity found some adhesions about the bladder. The bladder was contracted, walls somewhat thickened, and it was completely filled with calculi, which were also found in the cystic and common duct. Incision was made through the bladder near the duct and extending into it, and nine stones removed,

seven from the bladder and one from the cystic, and one from the common duct. These latter were removed by placing one finger through the foramen of Winslow and pressing the calculus towards the bladder, at the same time care being taken that the one in the common duct did not enter the hepatic duct. After removal of calculi the common duct was probed, when, finding the duodenal opening free, the edges of the wound in the bladder and duct were sewed, first with a continuous suture and then with the Lembert sutures. Then the parietal incision was closed,—first the peritoneum, then muscles, then integument. The stitch that came away was one in the muscles, as silk was used in all sewing except in the integument, where silkworm gut was the suture.

The average size of the stones was thirty-one grains; they were irregular in shape, showing facets where one pressed against the other, except the two in the ducts. The contracted bladder and calculi found in the ducts complicated matters and made the operation more tedious. The gland that Fenger alludes to as being found just above the common duct was distinctly felt, and gave one the idea, as he claims, of another calculus existing.

There are a number of interesting points in the case; first, the number and frequency of the attacks and the long period over which they existed; the delirium which was so persistent, and which at first I was at a loss to account for, whether it was due to her low condition, the anæmia of the brain, or whether some obstruction still existed, a calculus from hepatic duct not being found; but her jaundice having cleared up precluded this; or whether, owing to the repeated attacks, the cell-structure of the ducts were so altered that an auto-infection occurred, or that it was due to cholesteræmia or cholæmia. But the real cause was undoubtedly her opium habit, which had been acquired from opiates taken during her frequent attacks.

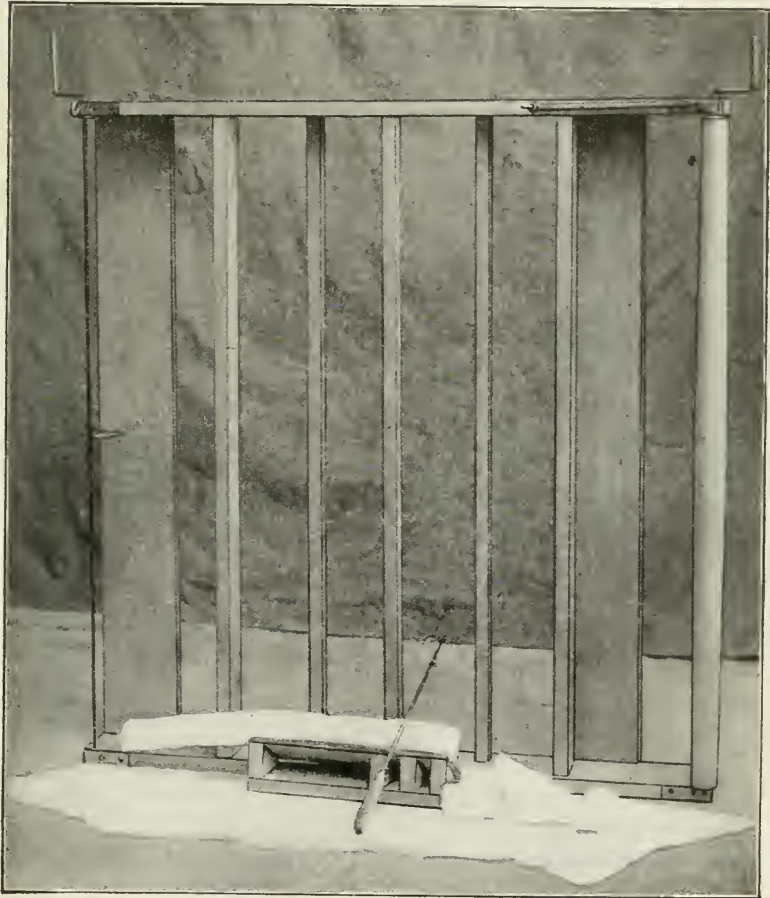
A PRACTICAL GAUZE BANDAGE-ROLLER.

By JAMES B. BULLITT, M.D.,

OF LOUISVILLE, KY.

THE accompanying cut is from the photograph of a bandage-roller which has been in use in Louisville for some years past, and which has proved a great saver of time and labor. The original machine was devised and used by Dr. Ap. M. Vance, of this city. The machine here represented is practically the same as the original model of Dr. Vance, differing in only a few improvements, for which I may claim credit. As it is now constructed, it is confidently presented as a most useful adjunct to the surgeon's and hospital's outfit. The machine is designed to roll a full width (thirty-six inches) of surgeon's gauze. The bolt of gauze, containing usually about a hundred yards, is placed on the floor on a sheet; the free end is then run in and out through the cross bars until proper tension is secured, and the entire bolt is wound onto the large wooden rod at one end of the machine. At the other end of the apparatus is a bar of three-sixteenths square cast steel, nickel-plated. This bar is so arranged that it can be immediately liberated from its bearings by the drawing out of a pin. The gauze is now rewound onto this bar in any lengths desired; for small bandages the rolls are conveniently made about one and one-quarter inches in diameter, and for the wider ones about two inches. These sizes produce bandages of about four- and seven-yard lengths respectively. If longer lengths are desired, of course larger rolls can be made. As soon as a roll of desired length has been wound on the steel rod the width of gauze is cut across with a knife or scissors. The steel bar is then disengaged by the drawing out of the pin; the roll is then held fast while the rod is given

a half turn backward, and then the bar is easily drawn out of the roll. It is the usual practice to work off the whole bolt in rolls of this kind. These rolls are then stored away and cut up into bandages as needed. For the purpose of cutting



Dr. Bullitt's bandage-roller.

the edges perfectly true, and at the same time protecting the knife's edge, I have devised the little trough shown in the cut. This trough is cut through three inches from the end, this being the width of bandage found to be most generally useful.

The knife works down through the slit, thus cutting the roll of gauze without having its edge come in contact with any other substance at all. A very long, old-fashioned amputating knife is best for this purpose. With such a knife the roll can be cut through with a single sweep, insuring a smooth edge.

These bandages are more generally useful than any other one kind of bandage, and it is needless to say they are much cheaper when prepared in this way. In addition to general uses these bandages serve admirably as the groundwork for plaster of Paris, being much cheaper and easier of preparation than crinoline, and making a bandage which is more permeable for water.

TRANSACTIONS OF THE SECTION ON GEN-
ERAL SURGERY OF THE COLLEGE
OF PHYSICIANS OF PHILA-
DELPHIA.

Stated Meeting, November 12, 1897.

The President, W. W. KEEN, M.D., in the Chair.

LATERAL CURVATURE OF THE SPINE DEVELOP-
ING IN A CURED CASE OF POTT'S DISEASE
TREATED BY A SPECIAL ANTERO-POS-
TERIOR SUPPORT.

DR. RANDOLPH FARIES presented a patient who, at the end of four years' treatment, had entirely recovered from Pott's disease. After the tubercular ostitis had subsided and all symptoms disappeared a lateral curvature began to manifest itself. Since the disease might have involved the bodies of the vertebrae more upon the right side than upon the left, and thus produced the lateral curvature, it seemed very rational to add some means of support to the antero-posterior support hitherto used which would correct the lateral curvature. With this end in view Dr. Faries adjusted to the lower part of the brace a piece of steel, which could be lengthened or shortened, with an arm crutch at its top, so as to elevate the shoulder upon the concave side of the curvature. On the opposite side he adjusted another steel piece with a plate at its upper end. From the centre of this plate four pieces of webbing were fastened, which acted as straps; two passing in front of the chest and two behind it. The direction of these straps was oblique. The first passing obliquely upward and across the chest to the crutch on the opposite side; the second obliquely downward and across the chest to a buckle on the pelvic band of the brace; the third passed obliquely upward and over the scapula to the crutch on the opposite side; while the fourth passed obliquely downward across the back to

a buckle also in the pelvic band. These four straps with the axillary crutch formed a triangle, the base of the triangle being the axillary rod and crutch, while the straps above and below formed the sides of the triangle: the apex of the triangle being where the straps were inserted into the pad on the opposite side. In order to straighten the lateral curvature it was simply necessary, gradually, to tighten the straps above and below on the side corresponding to the convexity of the curve. In this way the lateral curvature was entirely overcome, and after six months' treatment the patient was presented to show the good result. The modified support was really a combination of an antero-posterior and a lateral curvature brace.

It is interesting to note that the lateral curvature did not manifest itself before the tubercular ostitis had been cured. It would not have been safe to have employed an ordinary lateral curvature brace, because it would have allowed too much motion, and therefore might have stirred up the disease a second time. The patient's general health has been good for some time, and he has good motion in his spinal column.

COMPLETE REMOVAL OF THE PENIS AND TESTICLES FOR MALIGNANT DISEASE.

DR. GWILYM G. DAVIS reported the following case: He was asked by Dr. Hollopeter to see a man, aged fifty-nine years, who had always had phimosis. One year ago he noticed the skin around the glans becoming hard and apparently attached to the tissues beneath. Five months ago his health, which up to that time had been good, began to fail rapidly; a month later an offensive, foul-smelling discharge appeared. His family physician then slit up the contracted foreskin, letting out a considerable quantity of pus and exposing the glans, which was found to be a mass of ulcerating epithelioma. The patient was a very stout, fat man; when he came under the care of Dr. Davis he was evidently in bad health. His face was sallow in color with an anxious expression, tongue coated, and he had a poor appetite. His penis was shrunken and sunk in the surrounding tissues, and was the seat of a foul epitheliomatous growth. On the right side of the scrotum near the penis was a fungous protrusion, with a hard mass extending downward apparently be-

tween the testicles, but lying somewhat more towards the right side. The testicles did not appear to be positively involved, although the induration was so marked that it was impossible to outline precisely the extent of the carcinomatous infiltration.

The following operation was performed in St. Joseph's Hospital: The patient being placed in the lithotomy position, and a sound having been introduced into the urethra, an incision two inches long was made into the perineum, and the urethra separated from the corpora cavernosa to a considerable extent by blunt dissection, aided by a few touches of the knife. Several vessels were clamped by hæmostats and the remaining oozing controlled by gauze packing. An incision was then made beginning in the median line above the penis, passing around the scrotum on each side, and ending at the upper portion of the perineal incision already made. The upper portion of this incision was deepened, the bleeding vessels all being carefully clamped as they were cut, and the penis loosened from the pubic arch by dividing its suspensory ligament. The two spermatic cords were then divided one after the other and the bleeding vessels clamped with forceps. The two crura of the penis were partially detached from their insertion in the bone, a hæmostatic forceps applied to the remainder, and then cut off with scissors. The urethra was cut across and the mass removed. The hæmostatic forceps were taken off, bleeding points ligated, the urethra split sideways, and the two flaps cut pointed with the scissors, and sewed with chromicized gut to the skin, one anteriorly and the other posteriorly. The remainder of the wound was closed with interrupted sutures of silkworm gut, a drainage-tube inserted, and the line of incision painted with compound tincture of benzoin mixed with iodoform. A catheter was inserted and a dressing of gauze and cotton applied.

The first question that arose in this case was as to whether the testicles should be removed as well as the penis. Mr. Wheelhouse (*British Medical Journal*, 1886, p. 1886) had two patients, in one of whom he had removed the testicles and the other not. The former made an excellent recovery, and thanked him for the complete relief afforded; the latter said he wished that while he had been about the business he had made a complete sweep of everything. Mr. Wheelhouse says the testicles were, from first to last, a cause of trouble and distress. Soon after the operation

they became swollen and remained tender for some time; they were there as a possible seat for the return of the disease, and by their physiological action were a constant source of annoyance. One patient was as far as possible completely relieved, the other only partially so. Mr. Jacobson ("Surgical Diseases of the Urinary Organs") says that when the patient is advanced in life, or where his vitality is greatly depressed, castration should not be performed; but that in cases where there is reason to believe that castration will prove beneficial, he is in the habit of advising patients to have it done. In a discussion of this subject before the Medical Society of London, Mr. A. Pearce Gould, Mr. J. Morgan, and Mr. Walter Pye, all advocated a contrary course. Personally Dr. Davis was inclined to agree with them, and if the disease is confined to the penis would not be disposed to remove the testicles; that their removal adds considerably to the gravity of the operation he was firmly convinced. Any subsequent swelling and tenderness of the testicles arising afterwards may possibly be avoided by adopting more gentle methods, and taking care not to disturb them during the performance of the operation. Distress from functional activity of the organs is unlikely to follow because of the age of the patients. The case here given, aged fifty-nine years, is the youngest he had seen, more often they have been nearer seventy years. In the present case the evident extensive involvement, as seen on the surface, and the deep induration indicating possible infection of surrounding tissues, added to what had been said in favor of the procedure by Wheelhouse and Jacobson, all combined to induce him to do the more radical operation. The urethra was first dissected out through an incision in the perineum simply to avoid any likelihood of injuring it by a dissection from above downward. It was easily and quickly accomplished. The vessels of the cords were ligated separately instead of *en masse*. The urethra was split on each side and the flaps cut pointed, so that better approximation could be made to the skin than if they had been turned towards the sides. The introduction of a drainage-tube, the painting of the line of the incision, and the introduction of a catheter, around which the gauze could be nicely packed, were all done in an attempt to avoid subsequent infection of the wound. It was, however, all in vain. The catheter set up a cystitis and was removed on the second

day; by the fourth or fifth day the wound had so evidently become infected that he took out the sutures, parted it above and below, washed it out with peroxide of hydrogen and dusted slightly with iodoform. Troublesome tympanites was removed by enemas of turpentine and assafoetida, and the administration of creosote internally. The urine soon became normal in character and quantity, and the stomach quiet. He took his food all right and the wound rapidly granulated shut. In another case he would not carry the urethra quite so far down in the perineum towards the anus and would not be inclined to leave a catheter in the bladder.

As regards the treatment of the wound, he believed the most satisfactory plan would be to close its upper three-fourths by interrupted sutures and pack the remainder with gauze. This could be removed daily and discontinued as soon as aseptic healing of the wound was assured. It would efficiently drain the wound and obviate the necessity of using a drainage-tube, which in this case failed to meet expectations. The amount of tissue removed from between the rami of the pubes is so great that a dead space is almost sure to be left which will be very liable to become infected, unless packing is resorted to. A liberal use of iodoform is to be guarded against as, particularly in those advanced in years, it readily produces constitutional disturbances.

AMPUTATION OF THE FEMALE BREAST BY KOCHER'S METHOD.

DR. GEORGE B. WOOD described amputation of the female breast for carcinoma, done according to the method of Kocher, of Bern, saying that the operation is founded on the same principles, and accomplishes at least equal if not more favorable results than that of Halsted, and has the advantages of requiring less skill in the doing and less time for completion. In both operations the fundamental idea is to remove the malignant growth so completely as not to leave behind a vestige of diseased tissue.

In the operation practised by Kocher two convex incisions, only skin deep, are made around the breast, meeting on each side of it. The inner end of the lower incision is then carried along the posterior fold of the axilla, up over the welt formed by

the pectoralis major, stopping at the clavicle. The upper perpendicular incision is then deepened, and the pectoralis major and minor are divided close to their respective insertions. A broad pathway is thus opened to the axilla, and the axillary vessels are easily approached. A careful dissection of the vessels is now made, separating from above downward the fascia, fat, and glands in one mass, and not sparing any structure which may be involved. The fascia and fat covering the subscapularis are then separated in the general direction downward and inward towards the chest wall. If the subscapular nerve and artery can be cleanly isolated they are to be left behind, as their removal sometimes causes considerable laming of the arm, but if they be intimately connected with the diseased tissue they should be unhesitatingly taken away. The dissection of the axilla is continued in the same general direction, downward and inward, everything being taken out in one piece. The long thoracic nerve when not involved should be avoided. The incisions encircling the breast are now carried down to the pectoral muscles, the surgeon, of course, keeping well away from the diseased breast itself. An assistant seizes the loosened axillary fat and glands, together with the cut ends of the pectoralis major and minor muscles, and forcibly retracts them towards the median line, while a few strokes of the knife rapidly sever the whole mass from the chest; so that mamma, lymphatic glands, fascia, and muscle are all removed in one piece. In case of involvement of the glands above the clavicle, Kocher recommends to extend the clavicular incision upward into the neck, and to make a temporary resection of the clavicle. This would give the best chance for an open approach to the glands surrounding the subclavian vessels and to other chains in that part of the neck. It also makes it possible to remove in one strip the lymphatics accompanying the great vessels coming up from the axilla. Kocher also mentions that, in case of infiltration of the fascia immediately covering the ribs and intercostal muscles, a resection of a piece of the neighboring chest wall should be made. On account of the disability caused by the removal of the whole of the pectoralis major it is permissible in those cases in which the disease is not very extensive to leave *in situ* the clavicular portion of this muscle. The skin should now be united as far as possible, even if it must be put considerably on the stretch, and the places

left bare should be either immediately or in the course of a day or two covered in by grafting after the method of Thiersch.

The salient points of difference between this operation and the one mostly in vogue in America, that of Halsted, are: First, the incisions are different; the axillary incision of Kocher's allowing a freer entrance to the armpit, and not necessitating the loss of time required in dissecting back the triangular skin-flap of Halsted's operation. By Kocher the axilla is cleaned from above downward and inward towards the chest, while Professor Halsted makes the dissection from within outward and upward. Here it is claimed for the Halsted operation that the removing of fascia in this direction is easier and attended with less hæmorrhage, but why this is so is not stated. The vessels supplying the axilla begin above and run downward, and it is easier to dissect out a vessel from the base towards the periphery than in the other direction. Certainly a large vessel can be more readily seen and avoided than a small one. But where the operation of Kocher saves time as compared with that of Halsted is in the removal of the pectoral muscles; it being much easier to strip these muscles downward and inward off the chest and then to cut through the origins than it is to dissect off each rib attachment separately, as is required when the pectoral muscles are removed upward and outward. Also, in the Kocher method no extra dissection of the pectoralis minor is required. By beginning as advised by Kocher the annoyance of having a large, loose mass of tumor, fat, and muscle to take care of during the dissection of the axilla is avoided.

The idea of sawing through the clavicle in case of involvement of the supraclavicular glands belongs to Kocher, and though it may seem to some unnecessary, it certainly gives a much better chance to dissect the lymphatics from around the vessels.

DR. JOHN B. ROBERTS thought that the method of opening the axilla described by Dr. Wood very desirable. His own practice has been first to remove the breast with the tumor, after which he opened the axilla. If there is any danger of carrying cancerous tissue into the subsequent incisions, a fresh set of instruments may be employed.

DR. FARIES was impressed with the greater ease with which the comparatively large blood-vessels could be detected in fol-

lowing Kocher's method than if the opposite direction had been followed, when only the small terminal branches would be encountered at first.

DR. J. CHALMERS DA COSTA had once carried out this operation according to Kocher's description. The only difficulty which he had encountered was in finding the axillary vessels early in the operation. This difficulty he thought would be overcome by further experience with the method. He thought this operation to be in some respects an improvement over those that had been employed heretofore.

DR. G. E. DAVIS thought the chief advantages of Kocher's method was in removing the muscles from the insertion towards the origin, and also that the blood-vessels were more readily controlled and dealt with. For these reasons the operation might possibly be more quickly performed. On the other hand, the time consumed depends almost entirely on the care and thoroughness with which the operation is performed; one of the great advantages of Halsted's operation was that the tumor mass was first isolated, and by following up all its ramifications he believed a cleaner removal could be made. He did not think that Kocher's incision offered any marked advantages over that of Halsted.

DR. GEORGE ERETY SHOEMAKER said: The greater length of time required in operating after the manner of Halsted was evidently taken up in dealing with minute blood-vessels, especially in the axilla and the supraclavicular region. The removal from above downward would certainly be more rapid as far as the parts below the cross incisions of pectoral muscles were concerned; but there was nothing to show that the method described made it easier to deal with structures higher up.

THE OPERATIVE TREATMENT OF PNEUMOTHORAX AND PYOTHORAX.

DR. W. BARTON HOPKINS called attention to some details in the operative management of pneumothorax and of pyothorax, prefacing his remarks with the report of two cases of pneumothorax, one caused by bone puncture of the lung from the fracture of a rib; the other resulting from a stab-wound of the chest. The first case, a young man, received a violent blow over the right scapula at its lower angle. There was evidence of

fracture of a rib beneath the scapula at a point which could not be definitely located, as it was masked by the latter. General pneumothorax followed; the percussion-note being tympanitic over the right chest from apex to base. A medium-sized aspirating needle was inserted into the chest and a large quantity of air drawn off. The actual amount could not be determined, as no preparation had been made for measuring it, but the bottle required to be exhausted a number of times before the air ceased flowing. Towards the end of the procedure a small quantity of blood mixed with air came through the tube. Physical signs demonstrated the restoration of the lung, and as there was no recurrence of the pneumothorax, the wound of the lung had presumably closed. The patient made a rapid recovery.

The second case was that of a Chinaman, who received a stab-wound two inches long in the left chest, in the seventh interspace, at a point corresponding to the anterior axillary line. The wound was parallel to the ribs, and gaped so much that the interior of the chest could be plainly seen; revealing a large cavity containing at its posterior wall the collapsed lung; the latter appeared to be uninjured. Percussion gave, of course, a tympanitic note over the whole chest; the patient was in a state of extreme shock, his temperature being 95.8° F. He was transfused with normal salt solution and large doses of strychnine were given. The thoracic cavity was emptied of air in the following manner: Two deep sutures were introduced into the wound, but not tied; a small rubber tube, having about it a circular bit of rubber dam, was inserted into the chest between the two sutures. The sutures were then tied and the rubber dam, resting like a washer on the skin, was sealed in position with collodion, reinforced on top by rubber adhesive plaster. An air-tight joint being thus made between the wound and the tube, an aspirator was applied to the latter, and the air was pumped out until no more would come. When the aspirator was withdrawn the tube was tightly compressed, and finally reflected upon itself and tied. In four days the tube was withdrawn, necessary precautions being taken to prevent the re-entrance of air into the chest, and the small opening sealed. Ten days after admission the wound was healed, and ten days later the patient was well.

These two cases demonstrate with what ease air may be removed from the chest in traumatic pneumothorax. The first

case corresponds to idiopathic pneumothorax caused by perforation of the lung, as from the rupture of a tuberculous nodule. The second case corresponds with that variety of pneumothorax which follows the free evacuation of a pleural abscess. The third case, a simple empyema following on in the wake of typhoid fever, was referred to in order to suggest one or two details in the management of conditions so frequently accompanying and following empyema. In this case, as the patient was suffering great dyspnœa, ether was administered very cautiously, and an incision over the seventh interspace was carried into the chest. The rib was resected with trephining forceps, and about three quarts of pus flowed through the free opening. The patient became very much depressed, efforts at respiration being noticeably feeble. In order to overcome these alarming symptoms consequent upon the relief of pressure, the cavity was siphoned full of warm sterile water, which was retained by holding the wound firmly together with the fingers for about five minutes, until the patient had somewhat reacted, when it was allowed slowly to leak out until completely evacuated. Thus measurably re-establishing the intrathoracic pressure for the relief of general collapse after sudden evacuation, by the introduction of warm water, he had never done before; but in this case was of great use. The other detail he wished to mention in the case was an effort which is being made—for the patient is now under treatment—to reduce the capacity of the enormous cavity through expansion of the collapsed lung by the aid of atmospheric pressure. The patient is wearing a glass tube which contains in the outer end a puppet-valve. Whenever he coughs or moves in certain positions air and pus are expelled from the chest through the tube, but the inrush of air which naturally follows is prevented by closure of the valve. In this way a firm but gentle effort at suction is constantly being exerted, which, by reducing the pressure of air in the chest, it is hoped will facilitate the partial or complete expansion of the lung.

This simple device seems to accomplish this result as, besides other signs indicating improvement in this respect, since its use there has been a great diminution in the amount of discharge. In such cases, therefore, of comparatively acute empyema, in which the lung shows a tardiness in expanding or does not expand at all, it can be made to expand only by lessening

the air-pressure within the cavity. To aspirate the air from such a cavity could manifestly be of only temporary benefit, as the most important indication in the treatment has caused the pneumothorax by establishing an opening which gives free entrance to air and outflow to pus. This opening could not be sealed up long enough to allow the partial vacuum caused by aspiration to accomplish much in expanding the lung. And yet, in order to guard against and, if possible, avoid those deplorable results of chronic empyema, a collapsed lung, a pus-cavity whose walls contracted to their utmost have become indurated and unyielding, the diaphragm drawn up, the ribs depressed, and a fistulous opening continuing on indefinitely, whatever can be done should be done early while yet the lung is in condition to expand and before it is prevented from doing so by those changes which later on affect the suppurating pleura.

AN OPERATION FOR THE RELIEF OF SCAPHOID STERNUM OR SHOEMAKER'S BREAST.

DR. W. BARTON HOPKINS reported the following case: A girl, seventeen years of age, a school-teacher, though she had always had a malformation of her breast-bone, had never suffered any inconvenience from it until very recently. In the three weeks before she came under his care it had become exquisitely sensitive to light pressure, and caused her pain on deep inspiration. Being a nervous, anxious girl, of feeble health, it seemed desirable to attempt to correct, in a measure at least, the deformity by some simple method. Under ether, therefore, the sternum was bared by a vertical incision, and lifted up by two retractors which were hooked into the cartilage on either side, and forcibly drawn upon. The wound healed promptly and all the unpleasant symptoms ceased, though there yet remained a considerable depression.

DR. JOHN B. ROBERTS described a case in which, following an accident, the patient had persistent vomiting, which was supposed to be due to pressure of a broken or dislocated xiphoid cartilage. After watching the patient for some time Dr. Roberts was convinced that the vomiting was a neurosis, and subsequent events seemed to show that this was the case, as the man, he believed, entirely recovered under medical treatment.

CYSTOSARCOMA OF THE OMENTUM.

DR. W. W. KEEN reported the following case, operated upon by him two weeks before: The patient was a man, forty-eight years of age, who had been brought to him by Dr. I. C. Schureman, of Toms River, N. J., on October 25. About fifteen months before he had first noticed a lump, a little larger than an egg, in the lower right segment of the abdomen. It gradually increased in size, and of late rather rapidly, so that it finally filled most of the abdomen and caused him great trouble in breathing and somewhat increased frequency of urination. It had never been the source of any great pain. He had had no gastric or intestinal symptoms, excepting of late apparently from the compression of the stomach and bowels. There had been no jaundice. He had never had a history either of gall-stones or of renal calculi. No "flush-tank" symptom had been present, nor had there been any marked fluctuation in the size of the tumor. He had fallen in weight from 180 to 150 pounds. Examination showed the abdomen to be almost uniformly rounded. The tumor extended fourteen centimetres above and twelve centimetres below the umbilicus, and all the way from one side of the abdomen to the other. It was tense and elastic and a wave of fluctuation could be observed. All around it was an area of tympany corresponding to the intestines. Bimanual examination in the right renal region and in front seemed to show reciprocal pressure, but on the left side this was not true. Urine alkaline; specific gravity, 1014; urea 0.5 per cent.; no albumen or sugar. Microscopically a few uric acid crystals, granular leucocytes, and vesical epithelioma.

Operation, October 28, 1897. An incision was made an inch to the right of the middle line. The tumor was penetrated by a large ovarian trocar, and about three pints of dark bloody fluid withdrawn. Finally the incision had to be extended from a little above the pubes to a little below the ensiform cartilage. He was then able to deliver the tumor. On the right side it was free from any adhesions, excepting a few to the omentum, but below were many adhesions to the omentum, and on the left side the stomach was spread out fan-shaped over its entire surface. He finally was able with great difficulty to peel off the adhesions, ligating them as he did so. Once the adhesions of the omentum

were freed the tumor was entirely loose. After taking a great deal of time and care to arrest all the bleeding vessels, partly by ligature, partly by suture ligatures, chiefly through the wall of the stomach, he closed the abdomen, introducing a glass drainage-tube towards the stomach, on account of the free oozing that he feared might take place. He also flushed out the entire abdomen very freely with hot saline solution and left a pint in the abdomen. During the operation, hæmorrhage from the tumor itself was quite free, especially from its interior. Accordingly twenty ounces of normal salt solution were injected into the veins at the bend of the left elbow, by Dr. Spencer, during the operation, thus keeping his pulse in very fair condition. During the operation one-tenth of a grain of strychnine was administered, and immediately after the operation one-twentieth grain of strychnine was ordered every two hours at first, and also enemata of coffee and whiskey. He recovered very well from the anæsthetic, and was perfectly conscious in the course of a half hour after the operation, which lasted about an hour and a quarter.

On the anterior border of the liver was a small tumor, which was excised; no other was found. On examination the solid part of the tumor was evidently sarcomatous.

DR. COPLIN made the following pathological report: "The tumor is ovoid in outline, twenty-seven centimetres long by twenty-one centimetres wide. The external surface is smooth at points, but for the most part is rough, apparently by detached adhesions. Projecting from what appears to be one end of the tumor is a membrane apparently omentum, twenty centimetres long and eight centimetres wide. On one aspect of the tumor there is a cyst which has been opened. This cyst is sixteen centimetres long, nine centimetres wide. The inner wall of this cyst is irregular, traversed by bands which suggest remnants of smaller cysts. The wall is purplish over many areas, and incisions made into the purplish areas show that they are formed of extravasated blood. On another part of the tumor is an almost identical cyst of practically the same dimensions. This second cyst communicates with the first through an incision which has been made in the wall of the first. The walls of these cysts are soft, tearing with the greatest ease, and made up of two layers, which can be separated, showing between them points of

hæmorrhage and small, grayish, translucent nodules, varying in size from one or two millimetres to two centimetres in diameter. At one point the wall is very much thicker, five centimetres in thickness. Incision into this thickened area shows it to be made up of a soft, grayish, translucent matrix in which are numerous blood-cysts, the largest of which is one centimetre in diameter. Weight, 1870 grammes, or four pounds. The weight of the fluid was ten pounds, making fourteen pounds in all.

"Histology.—Tissue selected from the more dense portion of the tumor hardened in corrosive sublimate, stained with carmine and hæmatoxylin and eosin.

"Most of the tissue is made up of blood-channels, in many of which are thrombi in varying stages of infiltration by round cells from the surrounding tumor tissue. The tumor tissue proper is made up of mixed cellular elements, for the most part, however, round cells. Many of the round cells are large, a few of the larger are polynuclear. The intercellular substance is, at points, hyaline and nearly everywhere loaded with a brownish pigment. Some of the cellular elements also contain pigment. The thin walls of the blood-channels have at many points broken down, and the contained blood has infiltrated the surrounding tumor tissue. These areas of hæmorrhagic infiltration are evidently of different ages, some of them very recent, others old. Wherever they are old the tumor-cells are abundant within the areas of hæmorrhage.

"The general arrangement of the cellular elements at many points indicate an alveolar tendency.

"Diagnosis.—Mixed-celled (alveolar, melanotic) sarcoma, round-cell elements predominating. The mass shows advanced cystic change.

"The piece of liver is triangular in shape. One side of the triangle measures five centimetres, one side one centimetre, and one side three centimetres respectively, and five centimetres in thickness. It is distinctly liver colored. In the centre is a small white spheric nodule, four millimetres in thickness and apparently slightly raised above the surface. On section, the nodule is firm at its periphery and soft in the centre, although this less dense area is not apparently caseous.

"Histology.—The tissue was hardened in corrosive sublimate, dehydrated, infiltrated with paraffin, sectioned and stained with carmalum, also hæmatoxylin and eosin.

"The nodule is clearly defined and sharply differentiated from the surrounding liver tissue. The border is made up of a thin zone of small round cells not uniformly distributed around the periphery, more abundant at some points than others. Joining this zone is a layer of fibrous tissue, which is evidently old and rather hyaline. As this fibrous layer approaches the caseous centre of the nodule, the cellular elements are less fibrillar, of shorter spindles, and with more deeply staining nuclei. This line, or layer, of apparently more recent elements, stops abruptly with a jagged outline which borders the hyaline and caseous centre. This centre, about two millimetres in diameter, is composed of caseous cellular detritus and hyaline elements without any recognizable cellular structure. Nowhere in the mass are any points resembling tubercles, and the bacillus of tuberculosis cannot be stained in the nodule or adjacent tissue. There are no discernible blood-vessels entering the nodule.

"Much of the surrounding liver tissue is normal, many of the lobules fully so. Near the cut margin of the block is a layer of poorly staining liver tissue suggestive of some artefact. There is, at many points, a round-celled collection in the connective tissue between the lobules, and at one point the bile-ducts seem more abundant than one would commonly expect to find them. The capsule is, at points, slightly thickened.

"*Remarks.*—This specimen presents many points which, to us, are rather unique. The diagnosis, in our opinion, lies between a 'healed in' or quiescent tubercle nodule and a gumma with the preponderance of evidence towards the latter."

His recovery from so grave an operation was most gratifying. The highest temperature was 101° F., and it practically reached the normal by the third day, though rising towards night to about 100°. On November 8, the eleventh day after the operation, a thrombus of the femoral vein formed in the left leg. This caused him a great deal of pain for two days, but then quite rapidly subsided. November 12, fifteen days after the operation, the stitches are all out and Dr. Keen expected to have him out of bed within the next few days.

The most interesting point in connection with this case was the diagnosis. The origin of the tumor was on the right side of the abdomen. In view of the reciprocal pressure being felt in front and in the right renal region and the frequency of hydro-

nephrosis as contrasted with omental cysts, it was very natural to suppose that it might be a case of hydronephrosis. On the other hand, the entire absence of renal symptoms, the steady growth of so large a tumor, and the tympany in both flanks led him to believe it rather to be omental. He did not think that it was pancreatic, as it was too low in the abdomen. It was evidently cystic, as was evidenced by touch, but he did not anticipate from the examination that so considerable a part of its walls would be solid. The tumor was probably originally a sarcoma of the omentum and became cystic partly from hæmorrhage.

The danger of tapping such a cyst was well illustrated in this case, since, if it had been tapped in the upper part, the needle would have passed through the stomach, spread out like a fan over the tumor. The only other possible diagnosis was a cyst of the mesentery, which could not, of course, be excluded except by the operation.

From the operative point of view the only trouble was the difficulty of separating the stomach from the tumor, and the need for the utmost watchfulness to tie every bleeding vessel. The value of the salt solution was very plain, and it would seem that he owes his life to the use of it in the early part of the operation, not waiting till his strength was so exhausted by the loss of blood that he could not rally. No cause could be assigned for the thrombus. It appeared at about 8 A.M. suddenly after the best night he had had after the operation, during which he slept for nine hours.

ON THE USE OF GLOVES IN SURGICAL OPERATIONS.

DR. W. W. KEEN presented a sample of white cotton gloves, remarking that his first knowledge of the use of gloves was derived from Professor William S. Halsted, of the Johns Hopkins Hospital, Baltimore. He was the first to use rubber gloves (in the spring of 1889). He was led to use them by reason of his experiments on the disinfection of the hands and skin, which had convinced him that it was practically impossible to secure absolute disinfection, which fact he was, I believe, also the first to establish experimentally.

These views were first embodied in a Report in Surgery (Johns Hopkins Hospital Reports, Vol. ii, No. 5, March, 1891),

two years after he had used the gloves. From that time to this they have continued to wear the gloves in the Johns Hopkins Hospital within certain limits. In a letter Professor Halsted states his practice thus: "I wear gloves if, for example, I am removing a foreign body from the knee-joint or suturing a freshly broken patella, or exploring the abdomen or doing a simple hernia operation, or any other simple operation which does not require a delicate touch or dexterity, and which, if sup-puration supervened, might be followed by unpleasant results." His assistants always wear them.

Dr. Keen had found, however, several objections to their use; first, that they diminished the acuteness of the sense of touch; secondly, if they were small enough to fit the hand, they were difficult to get on; and if large enough to draw on easily they did not fit the fingers well and made manipulations clumsy. In addition to this, if they fitted well, they were very apt to tear when being drawn upon the hand. If kept long the rubber deteriorates to such an extent that they are useless.

As the cost is, on the average, nearly two dollars per pair, to one who leads an active surgical life or is attached to a hospital with many operations, the expense becomes quite considerable.

In the *Deutsche medicinische Wochenschrift*, June 24, 1897, p. 409, Professor Mikulicz, of Breslau, has recently referred to the use of cotton gloves. In order to know exactly what kind and quality of glove he used, Dr. Keen wrote to him, and he very kindly sent him a sample. These gloves are thinner than any to be obtained in Philadelphia, and great difficulty was experienced in obtaining any nearly as thin. Finally at Jacob Reed's Sons, 1412 Chestnut Street, quality almost as thin was found. The cost of the German gloves in Germany is seventy-two cents per dozen. The cost of gloves in America is two dollars and seventy-five cents per dozen. Dr. Keen had now used them in a sufficient number of operations to be able to say that he liked them very much. They are not thick enough to blunt the sensibility of the finger. Even a glove a little too large when it is wet, instead of making loose flaps at the end of the fingers, hugs the finger better than when it is dry. Ligatures do not slip in gloved hands saturated with blood as they do in fingers which have become slippery during the operation. If fæces or pus is en-

countered, as soon as one is through dealing with the pus or fæces, the first pair of gloves can be discarded, and after disinfection of the hands a second pair drawn on to complete the later clean part of the operation. Another additional element of value in using gloves is that one frequently has small cuts in process of healing, and it is impossible to disinfect the crusts over them as thoroughly as the rest of the skin. The subungual spaces are notoriously difficult to cleanse, and the use of the cotton gloves to a very large extent, though, of course, not completely, would prevent infection from any remaining bacteria under the nails. Of course, before they are used the hands are cleansed just as thoroughly as usual, and by the means which each surgeon prefers. The expense even of the American gloves is very slight, especially as the gloves can be used very frequently for two and possibly three operations. They are sterilized with the dressings.

Along with the gloves Professor Mikulicz sent one of his little caps and respirators. The cap is practically a skull cap, of muslin, which is disinfected with the gloves and dressings. This is a valuable addition in two ways. First, the surgeon and assistant stand upon opposite sides of the table, and when leaning over a wound almost constantly brush against each other's hair, and sometimes the heads thus come in contact. This must necessarily dust more or less of the foreign bodies in the hair, especially dandruff, into the wound. If the operator or his assistant's scalps are more than usually fruitful in dandruff the danger is correspondingly great. It would not be needful for any one else to use the caps other than the surgeon and his chief assistant at any operation.

Besides the cap, Professor Mikulicz uses a piece of gauze tied by two strings to the cap, and sweeping across the face so as to cover in the nose and mouth and beard. The intention of this is not only to protect the patient from the dusting of any dandruff or any other foreign body in the beard into the wound, but also to prevent either by the nose or mouth any involuntary infection of the wound from particles of saliva or mucus being ejected either in speech, sneezing, coughing, etc. If the operator has a long beard, this is a distinct source of danger to the patient, unless it is protected in some such way. For those who only have a short beard, it would not be objectionable, but it

hardly seems a necessity, especially if by taking off the collar during the operation the friction on the beard and under the chin is very much lessened. Only occasionally would a wound become infected from saliva or mucus. If one sneezes or coughs or makes any similar violent expiratory effort, merely turning one's head to one side seems sufficient. As to speech, the less talking that is done during an operation, except the necessary laconic sentences to the assistants, the better.

For the admirable clinical results obtained by Professor Mikulicz, one must refer to his original paper. Dr. Keen's own use of them had not been sufficiently long to enable him to give any statistical results, but the general clinical results have been very satisfactory. He had not made any bacteriological tests as to their preventing infection.

DR. GEORGE ERETY SHOEMAKER used a sterile towel pinned about his head instead of using a cap. He had used the cotton gloves and found them satisfactory, excepting when delicate manipulations were required. He believed them to be of great use when the hands suffer from the frequently repeated processes of sterilization, as it is possible, though, of course, not desirable, to lessen the amount of scrubbing between operations by their use.

DR. DAVIS remarked that one important use for these gloves was in the preliminary steps which are necessary just before an operation. When these are completed the gloves may be removed when the assistant is ready to proceed with the operation.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, April 5, 1897.

CASES OF TETANUS TREATED BY ANTITOXIN.

DR. WILLIAM G. PORTER reported a case as follows: A girl, fifteen years of age, was admitted to the Presbyterian Hospital, December 26, 1896, with the history that seventeen days previously she had stepped on a wire nail, which, after penetrating the sole of her shoe, had entered the ball of her left foot. On the morning of the eleventh day thereafter she began to notice some stiffness in the jaws. This gradually increased, and during the three days previous to admission there had been occasional locking of the jaws. She had also had for about thirty hours pain and stiffness in the lumbar region and occasional spasms of these muscles. During all the time previous to admission she had not been confined to bed, but was up and dressed, lying or sitting about the house. On the day previous to admission she consulted a physician for the first time.

On admission the jaws could not be fully separated though opening to about the extent of one inch. The back was markedly arched, abdominal muscles rigid, legs stiff, knees flexed, arms not apparently affected, the tongue could be protruded, pupils normal and reacted to light and distance, knee-jerks not obtained. She did not complain of very great pain, though back hurt somewhat. Mental condition clear. Clonic spasms of back occurred about every minute, but were not very severe. Temperature was 99° F., pulse 108, and respiration 24 on admission.

Examination of the foot showed that the nail had entered somewhat obliquely into the ball of left foot, but apparently had not penetrated the skin, at any rate, if it had, the wound had healed entirely, leaving no trace of itself. Beneath the skin was

considerable black dirt. The skin was cut away (under ether) for an area of about two and half inches in circumference, and the site of a punctured wound carefully, but unsuccessfully, hunted for. Though not found, the area was cauterized with pure carbolic acid and dressed in bichloride 1 to 1000.

At 11 P.M. ten cubic centimetres of antitoxin from the Pasteur Institute of Paris, prepared August 15, 1896, were injected into the right lumbar region, and at 1 A.M., December 27, 1896, fifty cubic centimetres more were injected into the left lumbar region.

The bowels not having moved for several days an enema was given, which resulted in a large, well-formed bowel movement. She was catheterized at 3 A.M. December 27, 1896, and twelve ounces of urine withdrawn. About this time she was groaning and restless, but said she had pain only in the back, and did not complain of it very much. At this time morphia sulphate, one-quarter of a grain, and atropia sulphate, one-hundredth of a grain, were given hypodermically. After four o'clock she slept two hours, spasms only occurring when disturbed by any sound or motion.

From 7.45 P.M. until 7 A.M. there were given potassium bromide 150 grains and chloral forty-four grains in addition to the above, being given at intervals of about two hours. This was continued varying the dose of chloral occasionally so that patient slept more than half the time. During night previous had about four severe convulsions and a number of lesser ones. Slept most of the time, moaning in her sleep, and seeming to suffer when awake. Twitching of facial muscles and clenching of teeth occurred at intervals. An enema was without result. Catheterized twice, fourteen ounces being obtained each time.

On 28th instant seemed somewhat weaker and was put on whiskey and tincture of digitalis. Mouth was dry and had occasional free perspiration. Last night the highest number of convulsions was eight per hour, and during two hours had only one slight one. Some of these were quite severe. Respiration was at times frequent and irregular. Passed seventeen ounces of urine during night, and received another enema, which produced no result. At 4 P.M. forty cubic centimetres of Mulford's antitoxin were injected into the right thigh. Several hypodermics of

morphine and atropine were given during the day when pain in back was severe. The number of spasms during the 28th instant was quite small, and were not very severe. She was catheterized twice this day. Temperature from 98.4° to 99.3° F., pulse 88 to 108, respiration 24 to 28. At 12 M. twenty cubic centimetres more of antitoxin were injected. Milk was taken about four ounces every two hours. She was asleep about one-half the time.

On the 29th instant she moaned and talked in her sleep, and complained of great pain in legs as well as back. Respiration more frequent and irregular. At 9 A.M. twenty cubic centimetres of antitoxin were again injected into left thigh, and again twenty cubic centimetres at 8 P.M. She cried and seemed to suffer considerably when awake, and morphine was given four times; hiccough every ten to twenty minutes.

On 30th instant slept most of the time. Pulse reached 130 to 140, respiration 28 to 44. Temperature began to rise at 4 P.M., being 101.4° and 8 P.M. 102½° F. She was given twenty cubic centimetres of antitoxin at 10 A.M. and morphine several times. Seemed to suffer somewhat less pain and slept most of the time. Urine began to be passed involuntarily during the afternoon. At 9 P.M. twenty cubic centimetres of antitoxin were injected. This making a total now of sixty cubic centimetres of that from the Pasteur Institute and 140 cubic centimetres of that manufactured by Mulford. Milk and medicine were still well taken, spasms less frequent and severe, but general condition, circulation, and respiration apparently weaker. On night previous was at times very restless, desiring to get out of bed.

On 31st instant much weaker; swallowing difficult, respiration reached 48, temperature 102° to 103° F., and pulse 120 to 140. Perspires freely at times. She sleeps most of the time, has occasional screaming spells lasting five to ten minutes. In the afternoon condition became comatose.

On January 1, 1897, temperature continued to rise, reaching 104½° F., pulse 140 to 150, respiration 60 to 70 and very shallow. Oxygen inhalations were given for ten minutes every half hour or hour. About 10 P.M. began to occur from two to twelve spasms per hour, but not usually severe, only eight were noted as being quite violent. Patient was nourished by means of milk, taking about fifty ounces during twenty-four hours, and water

was freely administered. Temperature about 100° , pulse 100, respiration 28 to 36.

On January 2, 1897, temperature at 8 A.M. was $106\frac{1}{3}^{\circ}$ F., pulse 144, respiration 70; condition moribund. Has been comatose all night. Had one or two screaming spells.

Death occurred about 10 A.M. Temperature by rectum, immediately after death, was $106\frac{2}{5}^{\circ}$ F., about one-half hour later reached 110° , and then gradually fell. Respiration seemed to fail more rapidly than the heart, pulse being perceptible until death.

Duration of symptoms, December 24, 1896, A.M., to January 2, 1897, A.M., about ten days.

The administration of antitoxin was not followed by any symptoms of local irritation or general constitutional disturbance. Urine analyzed daily was normal, except for a slight trace of albumen on 31st instant. Quantity and specific gravity normal. No effect seemed to be produced either upon symptoms or general condition after any injection of the antitoxin.

DR. CHARLES B. PENROSE reported a case of tetanus following trachelorrhaphy and perineorrhaphy, in which the antitoxin of tetanus was used without success. The patient was a white woman, thirty-two years of age, the mother of two children. She was a well-built, muscular woman, weighing about 140 pounds, and was in perfect health, except for the discomfort caused by a bilateral laceration of the cervix uteri, and a sulcus tear of the perineum. Dr. Penrose performed trachelorrhaphy and perineorrhaphy upon her, at her house in Chestnut Hill, February 24, 1896. The operation presented no features worthy of special note. He was assisted by Dr. Radcliffe Cheston, from whom the notes of the aftercourse of the case were obtained.

The solution used for washing the sponges and wound was a 1 to 2000 bichloride of mercury solution, made with unfiltered and unboiled water from the town supply. The instruments were sterilized by boiling. The small amount of dressing used had been sterilized by steam. The sutures were of silkworm gut, shot. Both the shot and the silkworm gut had previously been sterilized by boiling.

The patient did well, having no discomfort of any kind until the eleventh day after operation, when the first symptom of tetanus—viz., stiffness of the muscles of the jaw—appeared. The perineal and cervical sutures were removed on the following day.

Union was perfect. There was no redness, swelling, or other sign of inflammation about the cervical or perineal wound. After the removal of the sutures, the rigidity of the muscles of the jaw became more marked. The jaws became firmly set; the temperature went up to 103° F., and general muscular spasm over the whole body appeared. Large doses of chloral, bromide of potassium, and morphine were given to her, with the result of controlling the muscular spasm, and, as Dr. Cheston thought, somewhat improving her general condition. On the fifth day after the appearance of the tetanic symptoms the antitoxin of tetanus was first administered. The preparation was obtained from the New York Biological and Vaccinal Institute. Three bottles of the antitoxin were used in six injections before the patient died, two days later. The bottles contained each three grammes of the antitoxin. This was dissolved and administered in divided doses, according to the directions of the Pasteur Institute. Two hours after the first hypodermic injection of the antitoxin a marked change for the worse appeared in the patient. Her temperature became more elevated, and her pulse more rapid.

Both Dr. Penrose and Dr. Cheston believed that decided harm was done by the administration of the antitoxin.

DR. THOMAS S. K. MORTON reported the following case of tetanus treated by antitoxin as well as by bleeding and saline infusion: G. C., aged twenty-two years, was admitted to the Polyclinic Hospital January 22, 1897. On January 12 he stepped upon a rusty nail in the floor of a stable which penetrated his shoe and the sole of his foot for a short distance just above the base of the fourth toe. The wound was trivial and gave him no further annoyance until January 20, when he noticed a stiffness of the jaw and back of his neck. A few hours later it was noted that the act of swallowing would bring on an attack of dyspnœa. On the following day his troubles were more pronounced, and a physician was for the first time summoned. Upon admission to the Polyclinic at 2 P.M. the teeth could not be separated more than a fraction of an inch; neck was quite stiff, but no spasm of spinal muscles. He was placed upon liquid diet and given sixty grains of bromide of potassium and twenty grains of chloral every three hours. A calomel purge was at once administered. The cicatrix and whole surroundings of the puncture of the foot

was excised and stuffed with gauze impregnated with forty per cent. formic aldehyde in water. Temperature 99.4° F.; pulse 52; respiration 18. Chloroform was used to abort several threatened convulsions during the afternoon.

At 9 P.M. ten cubic centimetres of antitoxin were injected beneath the skin of the back. On the following morning temperature was unchanged, pulse 80, respiration 23. He appeared to be much easier, there had been no convulsions, the jaw could be opened voluntarily one and a half inches, and there was less stiffness of the neck. He had slept about eight hours. Bowels moved in response to enemata. Ten cubic centimetres more of the antitoxin (Pasteur, Chicago) were given at 12.30 A.M., 3 P.M., and 9 P.M. Chloral thirty grains and bromide of potassium sixty grains every two hours. Some convulsions present during latter portion of day, requiring chloroform inhalations. Convulsions occurred about every hour, lasted about two minutes, and were accompanied by violent dyspnoea.

January 24.—No more antitoxin procurable. That which had been given appeared to have had little or no effect. Temperature 101° F.; pulse feeble and rapid; delirium present. Stopped chloral and substituted morphine in one-quarter-grain doses every six hours. Convulsions continued about every hour and were combated by chloroform. During the chloroform anæsthesia the median cephalic vein at the left elbow was exposed and the patient was bled therefrom twenty ounces. This was at once followed by injection into the vein of two quarts of normal salt solution. Before bleeding pulse was 114; afterwards 144. After the infusion pulse was 112. He appeared much improved during the night and perspired freely. He was able to swallow and convulsions ceased for several hours. Next day he was conspicuously worse: temperature 103° , pulse 140. Clonic spasm in arms. Unconscious.

January 26.—He died during a severe convulsion. Spasms had been taking place every few moments for some hours previously. They would occur even when he was apparently fully under the influence of chloroform.

DR. JOHN B. ROBERTS had recently heard of a case somewhat similar to that of Dr. Penrose. A woman, a patient of Dr. Anna M. Reynolds, died of tetanus after having produced an abortion on herself with a penholder. The patient had experi-

enced a number of abortions before, but it was not known to the physician that they were self-induced until she subsequently admitted it. The metal end of the penholder was used and was thrust into the uterus. The patient became tetanic and was sent to the German Hospital, where she was given antitoxin, but the details of its administration he did not know. The patient finally died after the antitoxin had been administered several times.

His only personal experience with antitoxin was about eighteen months ago, when he, as a consultant, saw a man with mild tetanus following a scalp-wound. The symptoms were mild, and the antitoxin treatment was begun with a preparation from the Pasteur Institute in New York and one dose was administered. The attending physician did not believe the diagnosis, or was careless about the matter, and no more antitoxin was given, tonics being substituted. After death evidence of chronic meningitis was found, but the case was no doubt one of sub-acute tetanus.

DR. CHARLES W. DULLES said that he felt considerable interest in this subject, especially in connection with another disease that is very similar to it in its manifestations,—namely, hydrophobia. These two diseases can be looked upon at the present time as the opprobrium of surgery, as their exact nature is still largely in the dark. Many cases of tetanus, so-called, are so much like cases of hydrophobia that they are mistaken for it. The nature of tetanus was as little understood for many years as is the nature of hydrophobia, and the ancients knew almost nothing about it; they described its symptoms, and had their own methods of treating them, but they had no particular theory as to its nature. Until the time when Nicolaier isolated and described the tetanus bacillus, known by his name, no theory had been enunciated that had met the requirements of modern modes of thought. Of course, the Fellows of the Academy know the theory which Verneuil promulgated with so much skill,—namely, that all cases of tetanus are derived from the horse,—what is called the “equine theory.” Verneuil’s investigations seemed to him to show that tetanus is found only in individuals who have been in contact with horses or those to whom something from horses had been brought. This theory was very plausibly worked out. Just now the general belief is that

tetanus is always caused by products of a micro-organism. The old division of tetanus is clinically very good,—namely, into traumatic and idiopathic. Traumatism is in almost all cases the cause of tetanus, and the cases classed as idiopathic are extremely difficult to explain. He had seen cases of tetanus that seemed to be cases of imitation; and he remembered one case in which he could find no cause except moderate exposure to cold. The patient was a colored woman, who did washing, and who had a small blister, half an inch long and one-third wide, caused by a slight burn received five days before. This colored woman lived for about two days under observation, and then died, although she improved somewhat under medicinal treatment. His impression was that she was prayed to death, for all the time that her medical attendants were trying to save her life her friends were there praying over her; and the general expectation that she must die was not disappointed. The treatment of tetanus consisted for a long time in quiet and rest. In the management of horses the best treatment of tetanus consists—as Decroix has shown—in absolute quiet and letting them alone. It had been well said that many deaths from tetanus in human beings are caused by “incendiary medication”; and this is undoubtedly the case in regard to hydrophobia. He did not believe that the treatment of tetanus is materially more rational or successful to-day than it was a hundred years ago. We practically have only chloral and the bromides at our command for medication.

As to bloodletting and transfusion, described by Dr. Morton, this, of course, is not an altogether new idea, as it came up in the early part of this century, at which time bleeding was carried to an extreme; and interesting experiments in regard to transfusion were carried out by Magendie at that time. His experiments are interesting to read about, but they were not very practical, as they did no good.

As to treatment by antitoxin, the reports are very contradictory. There are those who think that most cases can be cured with this remedy; but careful investigators have gone over this subject, and have announced that no cases have been cured except such as would have been curable with any other method. In many cases other measures have been combined with the use of antitoxin, so that at the present time one cannot exactly esti-

mate the value of antitoxin. As to the antitoxin itself, some of that spoken of was obtained from an institution that he believed to be a fraud. There are two Pasteur Institutes in this country, and also a Pasteur Vaccine Company. These institutions have got into a sort of commercial warfare, and the latter has recently issued a pamphlet insinuating that the others make false representations. From what he knew he was not in the least surprised that some of the so-called antitoxin sold in this country should cause pyæmia instead of curing tetanus. Partly for this reason, he did not think that those present could speak from personal knowledge as to the value of antitoxin. Judging from what he had read, he should agree with those who entertain a rather poor opinion of it. He believed that cases of tetanus, either traumatic or idiopathic, may be wisely treated, as they often are, according to methods that are not new, and that have often in the past proved useful.

DR. JOHN B. ROBERTS said he did not think Dr. Dulles's remarks should go unchallenged. Dr. Dulles believes in idiopathic tetanus. Dr. Roberts thoroughly believed in the mycotic origin of tetanus. The medical profession has come to the opinion that infection through a wound is the cause of tetanus. Hence idiopathic tetanus is a misnomer. The wound of infection may have been forgotten by the patient, and be healed before the case of tetanus is seen by the surgeon. In the case mentioned by Dr. Dulles it is quite possible that the little burn was the source of the infection.

DR. W. JOSEPH HEARN said that he was convinced that there was no such thing as idiopathic tetanus. He had seen many cases of tetanus during the past two years, and had always been able to trace them to some lesion. It used to be said that tetanus was due to pressure on a nerve. He remembered the case of a man who had been working around a hotel, who manifested the symptoms of tetanus without giving any history of injury. He finally found a slight scratch on his arm which was really the cause of the infection.

DR. CHARLES B. PENROSE said that he had thought that possibly the cause of the tetanus in the case which he had reported might be found in the water which was used. The Schuylkill water at that time was exceedingly muddy, and although he used a bichloride solution, yet it was made from unfiltered and

unboiled water. He believed that there were three cases of tetanus occurring at about the same time in the Maternity Department of the University Hospital. These cases were reported last year by Dr. Hirst. Dr. Hirst looked up the statistics of death from tetanus at this time, in Philadelphia, and found that the mortality was a good many times greater than is usual.

DR. J. EWING MEARS said he had had no experience with the use of antitoxin, but he had treated cases with chloral and the bromide of potassium with good effect. He thought in all cases a lesion could be found, if carefully searched for. He recollected one in which an injury of the scalp was discovered only after a long search. He thought it very important that the administration of the antitoxin should begin early in the treatment. He for one could hardly expect an agent such as antitoxin to accomplish much after the tetanic condition was well established. The statement of Dr. Penrose with regard to the cause of the attack in the case reported by him was important, and should claim the attention of surgeons in operative procedures of all kinds. It would have increased greatly the value of the observation if it had been possible to have submitted the water to such examination as would have led to the detection of the bacillus of tetanus, if present.

EDITORIAL ARTICLE.

WHY MAY RECURRENT CARCINOMA BE LOCALLY WORSE THAN THE PRIMARY DISEASE OF THE SAME REGION?

IT is well known that an *incomplete* operation for the removal of a cancer is not only followed by prompt recurrence, but that the recurrent disease frequently progresses more rapidly and is locally much more diffuse and wide-spread than was the primary. There may be two causes for this, one pertaining especially to the disease itself, and the other to the physical condition of its seat. The operation may, and probably does, in many cases, act as a stimulus to the cancer, causing it to grow more rapidly, while at the same time it may lower the resisting power of the body to the unknown noxious influences which is the cause of the disease. It is, however, the physical condition of the seat of the disease and its effect on recurrence that this note is meant to discuss. In order to have a clear conception of what takes place in recurrence, it is necessary to review, in a few words, our knowledge as to the spreading of carcinoma.

(1) The most unusual method of dissemination is through the blood circulation. Here the disease infiltrates the wall of a small blood-vessel, and a small portion of the neoplasm, capable of growth, is carried to another part of the body and there gives rise to a secondary nodule. This is a rarity.

(2) The usual method is through the lymphatic system. Let us take the breast as an example. The first question to be considered is, Through what routes does the normal lymph drainage of the breast flow?

(a) The most important route is through the axilla. The

small lymphatics of the breast run up towards the armpit, where they form trunks and meet with lymphatic glands, then these trunks go up under the clavicle and, after more glands are passed, enter the venous circulation. This is the most common route for the lymph to take, and in extensive operations on the breast the lymphatic *trunks* are always divided.

(b) Lymph radicles pass from the deeper portions of the mamma and follow the perforating branches of the internal mammary artery in their course through the pectoral muscles and the intercostal spaces to the inside of the chest wall, and by this route reach the root of the neck. Judging from the fact that this lymphatic system is fairly early infected in mammary cancer, it must normally be responsible for a considerable part of the drainage of the breast.

(c) Gerota has shown (*Archiv für klinische Chirurgie*, Vol. xlv, p. 280), contrary to the generally received notion, that the lymphatics of one side of the chest anastomose freely with those of the other side, and hence, under certain conditions, drainage of the breast may be accomplished by the lymphatics of the opposite side of the body.

(d) The same observer has traced a leash of lymphatics downward from the mamma. These lymphatics having reached the lower margin of the ribs follow the course first of the superior and then of the deep epigastric artery. By this route they reach the inguinal glands. A lymph-gland may be situated on the internal surface of the rectus muscle near Douglas's fold.

When a mamma has been extirpated and the axilla cleared of its lymph glands, it is of course necessary for the region operated upon to be drained of its lymph. In the operation the axillary lymphatic *trunks* have been destroyed, and hence we cannot expect much service from this system. Just as in the case of the ligation of an important blood-vessel, a collateral circulation is established by the enlargement of subsidiary vessels, so also must it be in the case of occlusion of important lymphatic

trunks. This collateral circulation is provided in the case of the breast by the lymphatics of what we may, perhaps, term secondary importance, and to which reference has already been made. Let us suppose now that a breast has been removed for cancer, that *all* the diseased lymphatics in the axilla have been removed, but some carcinomatous tissue has been left on the chest wall and begins to grow. This is true local recurrence. The axillary route, normally the chief drain for the mammary region, is destroyed and its place is taken by a host of subsidiary lymphatics, which go in all directions, and by roundabout paths reach the venous system at the root of the neck. By all these paths does the cancer disseminate itself, and so we can easily understand how a recurrent cancer of the breast becomes very rapidly spread over a very large area of the chest wall. Some primary cancers show a similar disposition to become locally wide spread. It seems to me that a simple explanation of this disposition may be found. In such cases, I take it that early and excessive infiltration of the axillary glands and lymphatics causes occlusion of this drainage route, and so the state of affairs is practically the same as when an extensive operation has been performed. Does this same process hold good elsewhere than in the breast? Quénu and Louquet (*Revue de Chirurgie*, February, 1896), in a long and instructive paper on secondary cancer of the umbilicus, have shown that cancer at the umbilicus is not uncommonly secondary to cancer of the stomach and pylorus. These writers clearly trace the route taken by the cancer from its primary to its secondary seat. One of the important normal lymphatic systems draining the stomach walls is by vessels running parallel to the right gastro-epiploic artery. These lymphatics communicate with those on the inferior surface of the liver. Most of the drainage of the inferior surface of the liver is by lymphatics which descend in the right border of the lesser omentum to the cœliac glands, but some of the lymphatics, instead of taking this route, pass along the lower free margin of the suspensory liga-

ment with the remnants of the umbilical vein of the foetus, and so reach the umbilicus.

Cancer of the stomach, under ordinary circumstances, does not spread along the lymphatics last mentioned. It commonly gives rise to nodules in the coeliac glands, in the liver, etc. Wherefore is it that it occasionally passes to the umbilicus and from there, perhaps, to the inguinal glands? It seems to me probable that in such cases, from accident of the disease, the usual channels of drainage have become impeded and, as in the breast, subsidiary routes, of which the umbilical is one, are brought into prominence and participation in the disease. The idea of collateral lymphatic circulation, occasioned by the usual routes being impaired in efficiency through the disease, is, I think, of importance in explaining unusual forms of lymphatic involvement in cancerous disease.

JOHN F. BINNIE.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. Immunization and Serumtherapy in Staphylococcus Infection. By DR. WALTHER PETERSEN (Heidelberg). The efforts made in the direction of treatment of diseases due to streptococcus and staphylococcus infection by serumtherapy have not been pursued with the same earnestness as has been directed against many other forms of bacterial infection. This statement applies more particularly to the study of staphylococcus infection, as very little has been done in continued judicious experimental work. At the outset the question naturally suggests itself, whether this particular form of bacterial infection presents the conditions favorable for establishing a successful serumtherapy. The future must decide, for we cannot reason by analogy, and the optimistic view, inspired by the success of Behring's treatment of diphtheria, that it was only a question of time before each and every form of bacterial life could be successfully combated, has not yet been realized.

There are three important questions to be faced in considering the feasibility of serumtherapy in general:

- (1) Is the disease an infection or an intoxication?
- (2) Does one attack procure a natural immunity from a second?
- (3) Can protective material be found present in the bodily fluids after recovery from an attack?

To what extent can a positive answer be given to the above question when applied to staphylococcus infection?

The importance of the first has been variously estimated in the past few years. The answer must be a compromise, for the

disease usually occurs as a toxic-infectious condition, the pure forms of the individual types being but very rarely observed.

The second cannot be answered with perfect exactitude. That an absolute and lasting immunity follows a single attack is denied by daily clinical experience; but cannot a temporary and relative immunity be secured? Clinical observations would occasionally point to such a possibility.

For the third question it can be said that antagonistic substances are recognizable in human blood-serum after convalescence from a severe staphylococcus inflammation.

These answers are of sufficient theoretical value to justify research in the direction of antistaphylococcus serumtherapy. Such attempts have been made by several investigators. The author had occasion to test the serum obtained by Vignerat, but without the success achieved by its discoverer. The latter had sufficient confidence to administer it to a patient from whom he removed a sebaceous cyst, and filled the resulting cavity with osteomyelitic pus, and closed the wound by sutures. The pus was subsequently aspirated, and showed that the staphylococci had been completely destroyed. Of the various so-called toxic substances obtained from the staphylococcus cultures, the author had to renounce making trial of Leber's phlogosin, as he failed to reproduce it. Of the others, Buchner's protein and the Brieger-Fraenkel toxalbumin were easily made, and it was found, experimentally, that a small dose caused local suppuration in animals, but the fatal dose was rather large. Experimental work, however, showed that neither the existing knowledge concerning the toxines, nor the work undertaken by the author, was sufficient to establish a firm basis for the carrying out of successful attempts at immunization.

Research was therefore made in a simpler manner, principally in three directions.

(1) Immunization with sterilized cultures. It was found that a previous injection of sterilized (by heat) culture either pro-

tected an animal from an otherwise fatal dose or at least definitely delayed death.

(2) Immunization with filtered cultures. The results obtained were negative, notwithstanding a diversity of methods employed.

(3) Immunization by weakened or diluted cultures. Serum thus obtained was used to treat animals inoculated with fresh cultures. The results varied widely, and while attended with a fair measure of success, nothing in the way of making a serum suitable for use in man was evolved.—*Beiträge zur klinische Chirurgie*, Band xix, Heft 2.

HEAD AND NECK.

I. Accessory Thyroid of the Base of the Tongue. By A. VON CHAMESSO DE BONCOURT (Freiburg). The following case was observed in the Freiburg clinic: Female cretin, thirty-seven years old; good family history; backward from birth; menstruation first appeared at twenty-four. Two years before coming under observation speech became somewhat unintelligible and the voice assumed a nasal tone; respiratory disturbances became manifest; but there was no interference with deglutition. On admission the patient presented the appearance of a ten-year-old child. No thyroid gland could be felt. With ordinary protrusion of the tongue little could be seen; but on drawing it forward and depressing the posterior portion one could see a tumor situated for the most part to the right and pushing the right half of the palate and uvula upward and backward. It was about the size of a large walnut, with the transverse diameter greater than its height and covered with shining, unchanged mucous membrane. Palpation showed that the base was smaller than the greatest diameter of the tumor, and that it was not deeply situated within the substance of the tongue. The finger could be swept between the epiglottis and the tumor.

Operation.—Chloroform anæsthesia and preliminary trache-

otomy. The tumor was removed mostly by blunt dissection after incision of the mucous membrane. Bleeding easily controlled by sutures. Convalescence undisturbed. Examination of patient six months later showed no change in the condition of cretinism, no recurrence of tumor, some slightly suspicious signs of operative myxœdema.

Examination of the tumor showed that in part it consisted of embryonal tissue, and in part of degenerated cystic thyroid tissue. In the mucous membrane over the accessory thyroid no glandular or excretory duct tissue was found.

The vascularity of these growths is very important for diagnostic and therapeutic purposes, some possessing very large venous plexuses. The microscopic appearances of these accessory thyroids may be only those of normal thyroid tissue or of the degenerative processes characteristic of affections of that gland.

The occurrence of thyroid tissue in the tongue must be attributed to foetal malformation rather than to a metastasis.

As a rule, the symptoms resulting from the presence of an accessory thyroid present no characteristic features. There may be some pharyngeal irritation, as if a foreign body were present, but the taking of food is seldom interfered with, and there is usually a similar absence of respiratory symptoms. Speech is generally altered, even in the least marked cases. Bleeding is a very important and not infrequent symptom: it is often mistaken for hæmorrhage from the stomach or lungs. The tumor is not always recognizable by simple inspection of the oral cavity, and its presence may first be revealed by the laryngoscopic mirror.

There are two methods of treatment. One is the modern plan of internal treatment by preparations of the thyroid gland, and should be the normal procedure with tumors presenting no urgent indications for surgical interference. The other method is that of operation. Treatment by puncture or incision of the tumor is to be discouraged, as it is not without danger.

Operative measures have been of various kinds. It is important to decide whether or not preliminary tracheotomy is indicated. In the author's judgment it is of the greatest value. There are three methods of operation. Removal by the galvanocautery loop; a method of very limited application and still less value: enucleation by dissection through the mouth; this method will generally suffice for the average condition; and removal through an external incision. The latter operation should be reserved for cases presenting unusually difficult conditions.

The good results obtained by operation are generally lasting. When a recurrence occurs, there is frequently a tendency to spontaneous retrogression.—*Beiträge zur klinische Chirurgie*, Band xix, Heft 2.

C. L. GIBSON (New York).

II. The Results after Laryngectomy for Carcinoma in Bergmann's Clinic. By DR. GRAF (Berlin). In this paper Graf gives the results obtained by von Bergmann in his operations for laryngeal cancer, performed from 1883 to 1896. During this period radical operations were done forty-eight times. (Twenty were total extirpations, nineteen were unilateral and extensive resections of cartilage, nine were resections of small portions of the larynx.) Of the forty-eight cases one was a malignant enchondroma; all the others were carcinomata.

Preliminary tracheotomy was always performed and a tampon-canula inserted. Hahn's canula was found to be the best, and only failed in one case (Case XVIII). At the close of the operation an ordinary tube replaced the tamponading instrument.

The operation generally began by a splitting open of the larynx. In this way a direct view was obtained, and a decision come to as to whether complete or partial laryngectomy was the better.

In twelve cases portions of the pharynx, œsophagus, and trachea required resection. In eight a pharyngeal or œsophageal fistula was made, but in four of these the defect could be repaired

at once. In two cases (Cases IV and XVIII) a portion of the anterior œsophageal wall was removed, and the resulting defect was closed by means of the epiglottis, which was turned backward and downward, and its freshened edges sutured in place. In one of these permanent union took place, in the other the stitches separated in eight days.

Metastasis in cervical glands complicated eight cases. The glands were generally easily removed through lateral incisions. Two of these cases seem permanently cured (Cases VIII and XXI). One of the most important steps of the operation is to prevent all communication between the pharynx and the trachea, since the chief danger of the operation is infection of the air-passages. In total laryngectomy three methods were used to attain this end:

(1) By suture of the pharyngeal mucous membrane (recommended by Bardenheuer in 1890).

(2) By turning the epiglottis downward and backward. This was first done in 1886, and served the double purpose of closing an œsophageal wound and shutting off the wound from the pharynx.

(3) By suturing the trachea to the skin in the lower angle of the wound, and shutting it off from the rest of the wound by means of lateral skin flaps.

In partial laryngectomies the above methods are impossible, but their place is taken by a thorough packing of the wound. Generally saturation by mucus, saliva, food, etc., renders a change of the packing necessary in from five to six days.

Artificial larynges are only used when a whisper is insufficient to serve the patient's needs in conversation or business.

In order that the patient may whisper, it is necessary for air to get from the lungs to the mouth. In total laryngectomy communication between the mouth and trachea was cut off, but experience shows that the stitches used in making this closure rarely held, and so, as a rule, after the closure served its purpose it disappeared.

Swallowing is generally impossible for a long time after extensive operations, but to this there are exceptions. In one case, after total laryngectomy, the patient was able to swallow at once.

The period during which a tracheotomy-tube must be worn after an operation varies greatly. In five out of twenty-eight cases of *partial* excision, it was impossible to do without the canula.

Results.—Complete laryngectomy. Between 1883 and 1890, eleven cases; three died,—45.5 per cent. After 1890, nine cases; one died,—11.1 per cent. Cause of death in the one case was diffuse suppurative bronchitis. No recurrence in two cases,—10 per cent.

Unilateral and extensive resections of larynx. Before 1891, eleven cases; four died,—36.4 per cent. Since 1891, eight cases; one died,—12.5 per cent. No recurrence in four cases,—21 per cent.

Resections of small portions of larynx. Number of cases, nine; three died. No recurrence in four cases,—44.4 per cent. —*Archiv für klinische Chirurgie*, Band lv, S. 399.

FEMALE GENERATIVE ORGANS.

I. Operative Treatment of Retroflexion of the Uterus ; Anterior Cuneo-Hysterectomy, combined with shortening of the Round and folding of the Broad Ligaments. By PROFESSOR THOMAS JONNESCO (Bucharest).

Step 1.—Median laparotomy: uterus freed from adhesions and brought forward, with the aid of vulsella, into wound.

Step 2.—After reduction of the flexion a transverse incision is made through the uterine peritoneum beside the vesico-uterine fold. This cut extends the whole width of the uterus. The lower lip of this wound is seized with forceps, and the right index-finger detaches the bladder from the uterus for two centimetres. The anterior uterine wall is denuded of peritoneum over a surface of three centimetres at the level of the flexion.

Thus an area five centimetres in extent is exposed on the uterus. From this surface a wedge of uterine tissue as wide as that organ is removed. The apex of the wedge touches the uterine mucosa. With a curved needle the wedge-shape wound is sutured and then the peritoneum. Catgut is used.

Step 3.—Is practically Wylie's operation for shortening the round ligaments and folding the broad.

Step 4.—Closure of the abdominal wound. Good results are claimed.—*Proceedings of the Twelfth International Congress of Medicine*, Moscow, 1897.

JOHN F. BINNIE (Kansas City).

BONES,—JOINTS,—ORTHOPÆDIC.

I. Congenital Dislocation of the Hip. By E. H. BRADFORD, M.D. (Boston). In an article on this subject the author comes to the following conclusions:

Congenital dislocation of the hip is a dislocation of the head of the femur upward, occurring in uterine life.

A shallow triangular acetabulum results.

A diminution of the angle between the neck and the shaft takes place, and there is a twist of the neck.

The capsule is altered by being stretched, thickened, first dilated in its upper portion, stretched across the acetabulum in the lower portion, and constricted at the rim of the acetabulum.

The most important obstacle to reduction lies in the attachment of the capsule displaced and thickened to the ilium above and around the front of the acetabulum, and to the anterior surface of the femur, especially to the lesser trochanter.

The shortened pelvi-femoral muscles also offer a resistance to reduction, and with the contracted capsule will prevent reduction or cause relapse.

Obstacles to the reduction of deformity also lie in the shape of the head and in the shallowness of the acetabulum.

Traction in the straight direction cannot effect a cure.

Traction in strong abduction with downward pressure upon the head may bring about reduction.

In children over two and under five years,—in some instances between five and seven years,—under an anæsthetic, forcible reduction can be successfully used. This can only be accomplished if the head of the femur is forced into and through the capsular neck dilating it, into the acetabulum, and only after the capsular attachments adducting and flexing the limb are thoroughly stretched.

Successful reduction is always accompanied by an audible movement of the head of the femur into the capsule; bandages and fixation apparatus are to be used to prevent relapse, until the contracted tissues are sufficiently long and the pelvi-trochanteric muscles have regained their power to a sufficient extent that a recurrence of the dislocation is impossible.

In cases older than seven and under fifteen years, and in some cases between five and seven years, an open incision is necessary for the reduction of the dislocation.

The line of incision following the outer edge of the tensor vaginæ femoris is the preferable incision.

Inability to reduce the head is due to capsular attachments from the acetabulum and ilium to the femur which have not yet been divided or stretched.

In old adolescents, or adults, where extensive alterations in the bones have taken place, operative reduction has not been successful.

The use of corsets and traction splints may improve the attitude, but cannot cure.—*American Journal of the Medical Sciences*, Vol. cxiv, No. 5, November, 1897.

II. The Use of combined Skin and Bone Flaps to Remedy large Defects in the Tibia. By DR. A. FREIHERR VON EISELBERG (Königsberg). In two cases where a large portion of the tibia was absent (in one removed because of sarcoma,

in the other, on account of injury) von Eiselberg was successful in obtaining continuity without shortening by an autoplasmic operation. His description of his first operation is as follows:

“An anæsthetic having been administered and a bloodless territory obtained by Esmarch’s apparatus, the scar over the tibial defect was excised. The end of the upper portion of the bone was freshened. Since the malleolus of the tibia had been much diminished in a previous operation it was removed and the upper surface of the talus vivified. A flap containing skin, periosteum, and bone was cut from the upper fragment of the tibia. The flap, fourteen centimetres in length, reached to the tuberosity of the tibia; its pedicle, four centimetres wide, was situated at the upper and inner side of the defect. The bone was divided by circular saw and chisel. The flap was twisted on its pedicle through an angle of 180 degrees in the same way as is necessary in König’s rhinoplasty, and its free margins were accurately sutured to those of the defect. The edges of the wound where the flap was obtained were approximated as closely as possible.” The result in both cases was excellent. The transplanted bone increased in size and strength in its new bed and there was no shortening.—*Archiv für klinische Chirurgie*, Band lv, S. 435.

III. Remote Results of Lannelongue’s Sclerogenic Method. By DR. P. COUDRAY (Paris). The author presented the remote results which he has obtained by the sclerogenic method of treatment, principally in cases of surgical tuberculosis and of hip-joint dislocations.

He has had 100 cases of surgical tuberculosis. Of these sixty-three affected the large joints, and thirty-seven were located elsewhere. He used the method in five cases of Pott’s disease with one satisfactory result. The results were doubtful in fourteen cases of tuberculosis affecting the fingers, the toes, and the anterior tarsus, except in one remarkable case of phalangeal tuberculosis. In fourteen cases of tuberculous glands he only obtained sclerosis twice. In three cases of subcutaneous

abscess cicatrization was produced more rapidly than is usual. In one case of tuberculous epididymitis the result was favorable.

It is well, then, to adhere to Lannelongue's indications and reserve the method for the large joints, some exception being made in the case of the hip, wherein only three recoveries took place without suppuration, while in seven there was suppuration. In thirty-two cases of tumor albus of the knee there were four deaths, of which one only could be attributed to the treatment. The cause of death was a rapidly evolved tuberculous meningitis. In eighteen cases without suppuration there were nine which recovered without other intervention; eight which recovered only after an *évidement* or partial arthrectomy. Out of ten cases which suppurated, seven recovered after partial arthrectomy and *évidement* of the bone.

In the ankle five non-suppurative cases gave three recoveries without other intervention; two recoveries after *évidement* of the astragalus. In five cases in which there was suppuration *évidement* of the astragalus was required three times and partial arthrectomy twice. There were six cases (five severe) of osteoarthritis of the elbow. All recovered after extensive operations, two of them being resections. In the wrist two non-suppurative cases recovered without operation; in two suppurative cases *évidement* led to recovery.

In congenital dislocation of the hip there were two favorable results. Here the injections seem to be perhaps as useful as the fixation treatment of Lorenz.

M. Coudray has had one case of schirrus of the mamma treated by sclerogenic injections six years ago, and which seems cured. In herniæ the sclerogenic treatment may be tried, because, contrary to Champonnière's opinion, such injections produce fibrous and bony tissues which persist for several years.—Proceedings of French Congress of Surgery, *Revue de Chirurgie*, No. 11 (Supplement), 1897.

JOHN F. BINNIE (Kansas City).

CONTRIBUTION TO THE SURGERY OF THE SACRAL REGION.

BY HENRY HUGH CLUTTON, M.C. (Cantab.),
F.R.C.S.,

OF LONDON,

SURGEON TO AND LECTURER ON SURGERY IN THE MEDICAL SCHOOL OF
ST. THOMAS'S HOSPITAL.

- I. SUCCESSFUL EXCISION OF SACRAL SPINA BIFIDA IN AN ADULT.
- II. SUCCESSFUL EXCISION OF A CONGENITAL SACRO-COCYGEAL TUMOR IN A YOUNG CHILD.

I. EXCISION OF SACRAL SPINA BIFIDA IN AN ADULT.

THE patient was a woman, aged twenty-six years, who thought that, as she was engaged to be married, the tumor which she had had since birth should be removed.

As will be seen in the illustration, taken from a photograph (Fig. 1), the tumor was projecting backward on a level with the middle of the sacrum, but slightly to the left of the median line, and measured about fifteen inches in circumference.

I have recorded an exactly similar case in the *Lancet*, 1891, Vol. ii, p. 804, in which the spina bifida measured twenty-three inches in circumference. This was successfully removed for the same reason,—namely, that the patient was engaged to be married. The first patient of 1891 has since then married, and become a mother of one or more children. She advised the present patient, the subject of this notice, to come to me for the same purpose.

Dr. Picken, of Rotherham, wrote to me describing the case, and she was admitted into St. Thomas's Hospital in April, 1896. The skin over the tumor was thin but not adherent. There was neither a depression nor scar tissue in the centre,—conditions which are always present when the nerves are in the sac.

It apparently contained nothing but fluid, and was translucent. There was no impulse on coughing, and it could not be diminished in size by pressure. She felt, however, a dull pain in her head when lying on her back, and in this position a good deal of pressure was exercised upon the cyst.

This particular symptom was the chief complaint of the former patient, and had induced her to insist upon its removal. They both thought that this was absolutely incompatible with the married state.

I considered it certain that the tumor was a meningocele, and that possibly the communication with the interior of the spinal membranes had spontaneously closed, although from the pain in the head on pressure it was probable that the two cavities were in contact, and separated only by a thin partition.

The cyst was quite superficial to the sacrum and coccyx, which on the ventral aspect, by examination through the rectum, were found to be normal.

There was a little doubt felt as to whether it protruded through the centre of the sacrum or to one side of the centre, for, as before stated, it was not quite in the median line, and the cyst was too large and tense to push it away far enough to feel an aperture in the sacrum. At a little distance below the tumor there was a dimple in the skin from which hairs were growing. This was too far away to have any actual relation to the cyst, and was important only as an indication that there was in this neighborhood a congenital imperfection of development.

On May 13 the tumor was removed. Excision of the whole sac, with a portion of skin overlying it, which was very thin, exposed a large membranous opening in the sacrum, through the centre of which a fine peduncle could be traced from the cyst into the central canal. When this was divided to complete the removal of the tumor, fluid escaped. It was then clear that the peduncle was a very fine channel leading into the spinal membranes, and a probe was easily passed for a considerable distance into the spinal canal. The tumor was therefore a meningocele, and the communication with the subarachnoid space had not been completely closed. The opening in the spinal membranes was carefully sutured with catgut, and the skin with silkworm gut. No drainage-tube was employed. The dressing which was then applied was not changed for a week, when the wound was



FIG. 1.—Mr. Clutton's case of sacral spina bifida.



FIG. 2.—Sacro-coccygeal tumor, posterior view.



FIG. 2.—Sacro-coccygeal tumor, lateral view.

found healed, and the sutures were removed. The temperature had been normal, and the patient free from any symptoms.

On May 24, eleven days after operation, there was a sudden escape of clear fluid, which was evidently cerebro-spinal. This came through a very large dressing, which had been applied for fear of this accident occurring, into the bed. The temperature did not rise, and there were no indications of any complication, except the escape of this clear fluid, which continued for three weeks, and required frequent change of the dressings.

The discharge slowly but steadily diminished during June, and after closing and reopening two or three times the wound was considered to be finally and soundly healed on July 9. Beyond the escape of the fluid, which was undoubtedly cerebro-spinal, she had no symptoms whatever to cause anxiety. The specimen showed simply the sac of a spinal meningocele, about five inches in length, with a portion of the skin overlying it.

II. CONGENITAL SACRO-COCCYGEAL TUMOR.

The difficulty and danger of removing so large a tumor in a young child have induced me to place this case on record. The case was kindly sent to me by Dr. Roalfe Cox, of Mortimer, in 1894, when the child, a boy, was about twelve months old. He was rather small and feeble for his age, and it was felt that the removal of so large a tumor would be almost certainly fatal from the shock of the operation. In 1895 the case was seen again, and again the operation was postponed.

In April, 1896, he was readmitted into St. Thomas's Hospital in the hope that he was now strong enough to stand the shock of a severe operation.

He was now three years of age, and, as will be seen by the illustration (Fig. 2), the tumor projected from the buttocks, and hung half-way to the knees.

Although it had increased in size since it was first seen, the increase was scarcely more than would be accounted for by the rate of growth in the child. This was what had been anticipated, as the case was a purely congenital tumor, having its origin in an obsolete canal,—the postanal gut. Being a tumor from an error in development, it was believed that the operation would not be more severe by being postponed, but that the child would be older and better able to stand the shock of operation.

With regard to the diagnosis, it should be stated that the coccyx could be felt lying on its posterior aspect, and that the anus could be seen in front of it. The tumor, therefore, had its origin between these two parts, and examination per rectum proved that it extended some little distance upward, between the rectum on the one hand, and the sacrum and coccyx on the other.

The principal mass terminated abruptly within easy reach of the finger in the rectum, but above that a globular tumor could be felt, about the size of a cricket-ball, at or near the promontory of the sacrum, in which there was a distinct impulse when the child cried.

Externally the tumor was apparently composed of one large cyst, which was translucent to transmitted light, and a smaller mass on one side, which was solid or minutely cystic. The skin was freely movable over it. Its greatest circumference, taken on a level with the anus, was nineteen inches.

The case was shown at the Clinical Society on April 24, 1896, before any treatment had been commenced. It was proposed to tap the large cyst, so as to try and reduce its size, before proceeding to excise the whole tumor. This was done on May 6, when thirty-three ounces of clear yellow fluid, slightly tinged with brown, were withdrawn. The globular cyst felt high up in the pelvis was not altered by this procedure. On testing the fluid with nitric acid it became almost solid.

A fortnight afterwards—May 20—the cyst had partially re-filled, and was again tapped. The fluid withdrawn amounted to fourteen ounces as against thirty-three on the first occasion.

On May 27 (three weeks after the first tapping) the operation for its removal was undertaken. A large flap of skin was reflected from one side, and then the tumor, with the rest of the skin covering, was dissected carefully from the rectum.

As the tumor was dragged away a smaller round mass, loosely attached to the larger, appeared from within the pelvis. This also was removed, and must have been the tumor previously described as lying close to the promontory of the sacrum. It would have caused some delay to have verified this at the time, and the boy was not in a fit condition for prolonging the operation, even if it were left behind, and examination per rectum would have been necessary to prove the point.

When the examination was made some weeks afterwards, the globular tumor, which was about the size of a cricket-ball,

nearly opposite the promontory of the sacrum, was no longer there. The operation had to be hurried at the last as the boy's pulse could not be felt, and he was clearly suffering deeply from shock. He was infused with normal saline solution on the operating-table, and rallied fairly quickly.

The coccyx, which projected almost at right-angles from the sacrum, was removed and the wound closed.

After a few hours there was no longer any anxiety about the shock, from which he rapidly revived.



FIG. 3.—Sacro-coccygeal cyst removed by operation.

The large wound healed quickly, and at the end of a fortnight was quite sound, with the exception of a small sinus with scarcely any discharge.

This also was healed in another week, and he left the hospital early in July. He did not suffer from any incontinence of fæces, so that the removal of the coccyx produced no ill consequences.

The tumor (Fig. 3) has since been prepared for the museum and examined by Mr. Shattock, who describes it as follows: "A cystic tumor, about six inches in chief diameter, which was removed by operation from the sacral region. The main and lower part of the swelling consists of a thick-walled cyst; into the upper part of this there projects a somewhat lobulated flattened growth, which microscopic examination shows to consist of a close mesh-work of delicate fibrils closely interspersed with branching cells, the processes of which are continuous with the intervening fibres, suggesting the tissue of a glioma. The tissue is very vascular, the walls of the vessels being here and there thickened and hyaline.

"Above the main cyst the remainder of the tumor is composed of fibrous-looking tissue, with a small amount of fat between. In this are many cysts and narrow, winding channels, some of which in the recent state contained hairs and a yellow, fatty material like that in many dermoid cysts, whilst the contents of the others were less yellow, with glairy mucus.

"A bristle has been placed in one of the many narrow, devious tracks in the upper part of the swelling which contained hairs. Microscopic examination of the more glairy contents revealed the presence of distinctly ciliated columnar cells. Scrapings of the cysts containing hairs showed typical squamous epithelium. Above the cyst, which lies in the upper half of the swelling, there is an ill-defined area with a less fibrous aspect than elsewhere, and there is a similar appearance in the left side above the cyst which constitutes the lower part of the tumor. Microscopic examination of the first mentioned revealed a close plexus of capillaries, with here and there an arteriole, the walls of which were greatly thickened and hyaline, and in which some red blood-corpuscles still remained. The main cyst was filled with a clear, yellow fluid, slightly tinged with brown. Its wall is thick and its interior wanting in smoothness and polish. No epithelium can be seen on it on microscopic examination. That which in the natural position was the highest part of the tumor and lay immediately in front of the coccyx consisted of an oval dermoid cyst containing degenerated epithelium and hair. This cyst was about one and a half inches in diameter, and was removed together with a small portion of subjacent tissue, which was continuous with the highest part of the preparation preserved."

THE INFLUENCE OF INJURY UPON THE DEVELOPMENT OF SARCOMA.¹

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DURING the past eight years I have had under my care, including both hospital and private patients, 170 cases of sarcoma. This large number of cases, of which I have careful histories, has given me an exceptional opportunity for studying the clinical features of this disease, and no feature, I may say, has impressed me more strongly than the frequent association of trauma with its early manifestations. In consulting the literature of the subject I find that there is a wide divergence of opinion, both as to the real facts and still more as to the probable explanation of these facts.

It is only by collecting and analyzing a large number of more or less closely related facts that we are able to reach important generalizations.

I believe that the subject under discussion has a most important bearing upon the etiology of sarcoma, and anything that can throw light upon this ought to be welcomed.

Another aspect, which has of late aroused considerable interest among the German surgeons, needs but to be mentioned to show its practical importance. This is the matter of accident insurance. If sarcoma in a large proportion of cases is really the result of an injury or an accident, the companies are liable; if not the result of an injury, they are not. Much is involved in settling this point. The present

¹ Read before the New York Surgical Society, November 24, 1897.

practice in American companies is, I believe, to admit the trauma as a causative factor only in such cases where the interval between the injury and the development of the tumor is very short.

Of 170 cases of sarcoma I have observed forty-six cases, or 27 per cent., giving a history of trauma. These may be classified anatomically as follows: Eighteen were osteosarcoma: of these 3 occurred in the tibia, 4 in the femur, 4 in the ilium, 1 in the clavicle, 1 in the jaw, 1 in the metatarsal bone, 1 in the metacarpal bone, 1 in the ribs, 1 in the humerus, 1 in the mastoid, 1 in the spine.

Of these 3 were osteo-chondrosarcoma; 1 spindle-celled, 2 mixed-celled, 10 round-celled, 3 doubtful.

The twenty-six cases of sarcoma of the soft parts are divided as follows: breast, 5 cases; parotid, 2 cases; thigh, 2 cases; testis, 3 cases; arm, 1 case; popliteal space, 1 case; thumb, 1 case; eye, 1 case; kidney, 1 case; foot, 1 case; axilla, 1 case; hand, 1 case; cheek, 1 case; neck, 1 case; leg, 2 cases.

Pathological classification: Round-celled, 29 cases; spindle-celled, 5 cases; melanotic, 5 cases; chondrosarcoma, 2 cases; cylindroma, 1 case; mixed-celled, 3 cases; doubtful, 2 cases.

Interval elapsing between Injury and Appearance of Tumor.—Tumor was first noticed in 8 cases within one week; 10 cases within one week to one month; 6 cases within one to two months, or 24 cases within two months; 7 cases within two to six months; 4 cases within six months to one year; 10 cases beyond one year.

Nature of the Injury.—In 14 cases the injury was a blow; in 12 cases a fall; in 4 cases a contusion; in 3 cases a scratch from finger-nail; in 2 cases a fracture of the bone, one the femur and one the clavicle; in 2 cases a sprain; in 2 cases a laceration; in 2 cases a strain (muscular); in 1 case a burn (carbolic acid); in 1 case a shot-wound; in 3 cases doubtful. Total, 46 cases.

SYNOPSIS OF CASES.

No.	Age.	Sex.	Diagnosis.	Site.	Nature of Injury.	Interval between Injury and Appearance of Tumor.
1	18	F.	Round-celled.	Metacarpal bone.	Blow.	At once.
2	28	F.	" "	Spine.	Fall.	1 year.
3	37	M.	Melanotic.	Thumb.	Contusion.	At once.
4	7	F.	Mixed-celled.	Ovary.	Fall.	2 months.
5	55	F.	Cylindroma.	Breast.	Blow.	1 week.
6	25	M.	Round-celled.	Testis.	"	2 years.
7	11	M.	" "	Thigh (popliteal space).	"	Less than 1 year.
8	59	M.	Angiosarcoma.	Breast.	"	3 months.
9	41	F.	Round-celled.	Arm.	"	2 years.
10	46	F.	(?)	Neck.	Scratch.	Soon.
11	8	F.	Round-celled.	Chest.	Blow.	6 weeks.
12	43	M.	" "	Mastoid.	Severe blow.	4½ years.
13	20	F.	Spindle-	Hand.	Fall.	1 year.
14	31	F.	Round-	Breast.	Blow.	Few days.
15	31	F.	(?)	"	"	" "
16	11	F.	Spindle-celled.	Femur.	Fall.	At once.
17	26	F.	Round-	"	Sprain.	1 to 2 years.
18	48	F.	Spindle-	Thigh.	Strain (muscular).	2 years.
19	29	M.	Round-	Testes.	Fall.	3 to 4 weeks.
20	22	M.	" "	"	Fall and contusion.	2 to 3 weeks.
21	27	F.	" "	Axilla.	Laceration (finger).	1 week.
22	55	M.	Mixed-	Parotid.	Blow.	4 to 6 weeks.
23	11	F.	Round-	Calf of leg.	Fall.	2 to 3 months.
24	14	M.	" "	Ribs.	Blow.	6 months.
25	53	M.	Mixed-	Parotid.	"	5 years.
26	14	M.	(Osteo) ?	Ilium.	Contusion.	1½ years.
27	30	M.	Round-celled.	Clavicle.	Fracture.	" "
28	26	M.	" "	Femur.	Sprain.	Few weeks.
29	55	M.	Round-	Thigh.	Gun-shot wound.	25 years.
			(myxosarcoma).			
30	27	F.	Round-celled.	Breast.	Burn (carbolic acid).	3 months.
31	36	M.	Osteochondro'a.	Shoulder.	Sprain.	6 months.
32	30	F.	"	Ilium.	Fall.	3 months.
33	38	F.	"	Lower jaw.	(?)	Few weeks.
34	29	M.	Mixed-celled.	Eye.	Scratch.	" "
35	55	M.	Round-	Ball of foot.	Laceration from nail in shoe.	" "
			(Melanotic).			
36	12	M.	Round-celled.	Tibia.	Fall.	2 months.
37	5	F.	" "	Femur.	Old fracture.	1 to 2 years.
38	24	F.	Round-	Tibia.	Fall.	At once.
			(Melanotic).			
39	16	F.	Spindle-celled.	Foot.	"	Few weeks.
40	26	M.	Round-	Tibia.	Blow.	" "
41	50	M.	" "	Kidney.	Fall and contusion.	6 months.
42	40	M.	Spindle-	Parotid.	Blow.	Few months.
43	39	F.	Melanotic.	Foot.	Contusion.	Few weeks.
44	50	F.	"	Leg.	Scratch.	Few days.
45	73	M.	Round-celled.	Tonsil.	Contusion.	Five days.
46	23	F.	Osteochondroma sarcoma.	Ilium.	Fall.	2 injuries, 1 ten yrs. 1 two yrs. before.

A very striking illustration of sarcoma following traumatism has been kindly given me by Dr. William T. Bull. In 1888 he operated upon a dentist with sarcoma of the lower end of the femur, following an injury caused by knocking the thigh against the lever of a dentist's chair. This patient stated that he had personal knowledge of six other dentists who had developed sarcoma of femur from the same injury.

Dr. Carl Pfister tells me that, while serving in the German army, it was a custom in the athletic exercises to jump over a bar, the feet passing between the hands. In performing this exercise it was a common accident, especially before becoming accustomed to the exercise, to strike the tibia against the bar. He states that he has known of four instances where sarcoma developed after this injury.

Much has been written from time to time concerning the relationship between traumatism and malignant tumors, but it remained for C. Löwenthal, of the Pathological Institute of Munich (*Archiv für klinische Chirurgie*, Band xlix, 1895), to make a systematic attempt to collect all the reported cases in literature and to carefully analyze the large series of cases—800 in number—which he was able to find. I shall omit the question of carcinoma and traumatism, and shall confine myself entirely to sarcoma.

Löwenthal found 316 cases of sarcoma in medical literature, giving a previous history of local injury, and of each one of these cases he has given a brief history. An analysis of his cases shows that in fifty-four cases the location of the tumor was in the skull and brain; it was the face, mouth, and nose in 24 cases; throat and neck 9; chest 30 cases, of which 17 occurred in the thoracic wall, 10 in the mammary gland, and 3 in the thoracic cavity; in the back and vertebral column 7 cases; abdominal wall and cavity 8 cases; urinary organs 4 cases; pelvis and lumbar region 12 cases; genital region 21,—all male; upper extremities 42 cases; divided as follows: shoulder and axillary region 9, upper arm 21, elbow 2, forearm 6, hand 4; lower extremities 103,—66 male and 37 female; divided as follows: hip 3, thigh 48, knee

7, leg 36, foot 9; multiple sarcoma 2. In all cases the totals show a great preponderance of male subjects,—216, or 68.4 per cent., occurred in males, while only ninety-seven, or 30.7 per cent., in females; in three the sex was unknown.

A study of the cases with reference to the *nature of the trauma* is of great interest. In seventy-nine cases—or 25 per cent.—the injury was a fall; in fifty-four—or 17 per cent.—a blow; in forty-three—or 13 per cent.—a lesion; in twenty-six—or 8 per cent.—a contusion or crush; in twenty-three cases—or 7 per cent.—a tumble.

In the other cases the injury took a great variety of forms; in two cases it having been a bite; in two a shock; in two the patients were trodden on the foot; in two it was extraction of a tooth. In twenty-nine—or 9 per cent.—the form of injury was unknown. In 190 cases the interval between the injury and the appearance of the tumor was definitely stated. This is a point of great importance. In 135 cases the sarcoma was noticed within one month after the receipt of the injury; in thirty-three cases the time that elapsed between the injury and the appearance of the tumor was between one month and one year; in twenty-two cases more than one year.

According to the statistics of Wolff, twenty out of 100 cases of sarcoma—or 20 per cent.—gave a history of trauma; in 344 cases of carcinoma the same author found a record of trauma in forty-two,—or 12.2 per cent.

S. Gross, in the *American Journal of the Medical Sciences*, July, 1879, collected 165 cases of sarcoma of the long bones, more than one-half of which gave a history of trauma.

From the current medical literature, as well as from conversation with general practitioners and even surgeons, one finds the idea very prevalent that traumatism is a factor of little or no importance in connection with the development of malignant tumors. The general impression is that the occurrence of the trauma is usually a matter of coincidence, without etiological significance.

Very recently, Dr. G. Walker (*ANNALS OF SURGERY*,

November, 1897), of Johns Hopkins Hospital, in a most excellent critical review of the operative treatment of sarcoma of the kidney in children, in discussing the etiology, states that out of 142 cases trauma of some kind was noted in thirty,—or 21.13 per cent.,—consisting principally of falls, kicks, strokes in the side, and jumping.

In one case, the boy received a kick in the side from a horse; hæmaturia immediately followed, and lasted fourteen days; some time later a malignant tumor developed.

Walker passes very lightly over this remarkable series of cases giving a history of trauma, stating, if an explanation be necessary, that of Weigert would seem the most plausible theory. He further adds that, on account of the protected position of the kidney, it is very improbable that it would be injured by anything short of extreme violence. He also states that the symptoms of the malignant growths are so far removed from the accident that probably no real connection could exist between them. After having cited thirty cases with a history of trauma, and one in particular in which the hæmaturia immediately followed, thus proving that the kidney had been injured, his conclusions that an injury to the kidney is very improbable would seem to be at variance with the facts presented. That *severe* injury to the kidney could not be produced by anything short of extreme violence, I am quite willing to admit; but the history of sarcoma following injury in exposed parts of the body, and in which the interval of time elapsing between the development of the sarcoma and the injury, makes it impossible to deny an etiological relationship, proves that an injury need not be by any means a *severe* one; in many cases it is only a very slight blow or contusion. In the light of these facts it would seem more than probable that the trauma was connected with the development of the tumor in the majority of the cases of sarcoma of the kidney, cited by Dr. Walker.

That twenty-five—or 30 per cent.—of all cases of sarcoma are directly or indirectly due to an injury is a fact that would be believed by few, unless one were prepared to submit

the proof of it. In 1882, Harrison Cripps, of London, himself a thorough believer in traumatism as an etiological factor in developing sarcoma, stated that not more than 7 or 8 per cent. of the sarcoma cases would give a history of injury. Cripps had noticed two significant cases in his own practice, one a female, aged forty years, with a history of rapidly developing sarcoma following a blood blister upon the foot, caused by wearing a pair of tight boots. The other was a sarcoma developing in the breast on the day following a kick.

What explanation, if any, can we offer for these facts? Many conjectures have been made. That which perhaps has the largest number of supporters is the theory of so-called constitutional diathesis. Butlin, Barwell, and many of the German surgeons are believers in this theory. Butlin says that there is probably a strong predisposition to the development of tumors in persons who break out in tumors on the application of violence. He believes that the injury would be harmless, unless occurring in a person possessing this constitutional diathesis, and holds that the evidence in favor of this theory is as strong as that which supports a like belief in struma or rheumatic diathesis.

Harrison Cripps has severely criticised this theory, and some of his points against it are well taken.

As Cripps very clearly puts the question: "It is the source from which these cells spring and the cause of their collection into tumors that is the real problem of pathology, and the so-called diathesis is no explanation at all. What the surgeon removes and the microscopist cuts into sections must not be regarded as the disease, but as the product of some hitherto unexplained irritation, a portion of which is almost certainly left behind, and which will, in time, cause a reproduction of the disease."

In attempting to explain this connection between traumatism and the development of malignant tumors, Löwenthal states "that the trauma in itself does not furnish the real cause for the formation of a tumor is apparent from the fact

that thousands of traumatisms are constantly occurring and but few tumors develop." This argument has been advanced by many others besides Löwenthal, and even Cripps himself has fallen into the same error; but it needs but a moment's reflection to prove that it is absolutely without weight. We are all of us constantly exposed to tuberculous, diphtheritic, and other infections. The fact that we do not all of us contract these diseases is hardly evidence that the germs to which we have been exposed have not been a causative factor in producing the diseases in the few persons who did contract them. The resisting power of the individual, local and general, is entirely lost sight of. The fact that only a few cases suffering from traumatism develop sarcoma is in striking accord with what we would expect from analogy if we regard sarcoma as an infectious disease.

Nerve Influence.—Schröder (*vide* Löwenthal, *Loc. cit.*) gives his experiments upon a rabbit as follows: He performed neurotomy in the thigh, then fractured the femur, and found that, instead of a normal callus, a tumor developed. He explains this phenomenon by the absence of nerve influence.

This view, although discarded for a time, has of late found a defender in Rindfleisch ("Lehrbuch der pathologischen Gewebelehre," Leipzig, 1886).

The theory of a *general predisposition*—a so-called specific diathesis, according to which a tumor will develop from external irritation only in case such predisposition exists—is strongly supported by Billroth.

The opposite view—that of the existence of a *local predisposition* which may be either inherited or acquired—is held by Virchow. He claims that through mechanical irritation a specific predisposition of the tissues for the future development of a tumor is produced.

According to Cohnheim, local predisposition is in all cases based upon an abnormal condition of the tissues, due to a *defective embryonal development*. Hence traumatism is of little significance.

This view is shared by Leopold and Maas.

Ackerman (cited by Berger, *Loc. cit.*) holds that the endless number of cases in which traumatism is not followed by a tumor do not disprove the relation between trauma and tumor so long as one believes in the local predisposition theory.

Löwenthal concludes his remarks by stating that the majority of the cases collected by him furnish sufficient proof for the assumption that external irritation may give rise to the development of tumors, and that, therefore, traumatism may be considered a direct etiological factor in the formation of tumors.

I do not propose to enter into any discussion of the various sporozoa or micro-parasites that have from time to time been described as having been found in sarcoma, and therefore as having a bearing upon the etiology of the disease. Passing over all this more or less conflicting mass of evidence, and even the recently reported successful inoculation of sacomatous tissue from man into animal, by Jürgens, I wish to approach the subject entirely from a clinical standpoint. I believe that the clinical evidence in our possession, aside from any bacteriological or pathological aids, point very strongly towards a specific infection as a cause for sarcoma. First, the analogy between sarcoma and diseases known to be of infectious origin is most striking. The analogy between sarcoma and tuberculosis has long been observed, and this was clearly pointed out by Sir John Simon, in 1877, long before the discovery of the tubercle bacillus. Shattock observes that this analogy is so close and striking that there is not a single step in a life-history of tuberculosis that has not an exact counterpart in sarcoma. This analogy goes even further than clinical symptoms and gross lesions, for the best microscopists have not infrequently to admit that they are unable to differentiate a tuberculous tumor from a round-celled sarcoma, even after repeated examinations and with the aid of a clinical history.

Similar analogy might be pointed out between sarcoma

and actinomycosis, glanders, and syphilis, all diseases known to be due to an infectious agent.

The theory of Cohnheim, however ingenious it may be regarded and however much it has gained from authority and tradition, must still be looked upon as a mere hypothesis, with no more, but even less, to support it than when originally advanced.

As Simon tried to make clear, we have allowed the anatomical forms to obscure the infectious properties "which constitute the real puzzle" of the disease, and, I believe, that until we can bring ourselves to put these anatomical and pathological forms in the background, and study the disease from a larger view-point, taking in the whole clinical picture of the disease, from its first local manifestations until it has invaded the entire organism and destroyed life itself, we cannot hope to solve the vexed problems of etiology, and institute more rational and scientific methods of treatment.

Looking at these cases that I have related, and other similar ones, from the stand-point that I have referred to, it seems to me the best explanation of this relationship between the trauma and the development of the sarcoma may be stated as follows:

Discarding *all* the various theories that I have referred to, and admitting for the moment the truth of the theory that sarcoma is due to an infectious micro-organism (and I may say there is far more evidence to support this view than Cohnheim's or any yet ever offered), admitting the truth of this theory, the rest becomes easy.

We have then only to follow out the analogy between sarcoma and tuberculosis. If we can explain how it is that tuberculous inflammations of the bones develop after an injury in children previously apparently in good health, then the same explanation could be applied to sarcoma. I have at present under my care two typical cases of tuberculosis following trauma. One is a tubercular epididymitis, developing directly after a kick in a young man, aged seventeen years. In this case there was a family history of tubercular

trouble; the second is a case of caries of the spine in a child two and a half years of age following a fall. That such cases are by no means uncommon has been proven by Guder and other surgeons. The probable explanation is that the tubercle bacilli exist latent in many individuals, and may remain harmless indefinitely under normal conditions. The trauma lowers the vitality, and hence the resisting power of the part injured, and the bacilli previously innocuous gain a foothold and develop. We know that we can get a suppurative periostitis from traumatism without any breaking of the continuity of the skin, and we must explain this in the same way.

It is not difficult to believe that the infectious cause of sarcoma is one widely distributed and generally innocuous until some cause—*e.g.*, a trauma—places the tissues in such a condition as to furnish the proper soil for its development.

That we have not found this infectious cause is no argument that it does not exist. It is simply a proof of the limitations of our present knowledge and the imperfectness of our present methods. Surely the evidence in favor of its existence is sufficient to stimulate us to further research.

BRIEF RECORDS OF AUTHOR'S CASES OF SARCOMA GIVING HISTORY OF TRAUMATISM.

CASE I.—Sarcoma of the Metacarpal Bone.—B. D., female, eighteen years of age. No history of heredity, and in perfect health up to August, 1890, received a severe blow upon the back of the right hand from a revolving chair in a parlor-car. A slight swelling appeared immediately. At the end of a week, instead of having decreased, it has slowly increased and become very painful. The patient consulted several physicians, but it was regarded as nothing more than a contusion.

I first saw her in September, 1890, about six weeks after the injury. The wound then had the appearance of a periostitis, but incision under ether failed to find pus. Shortly afterwards a piece of tissue was removed for microscopical examination, and which showed it to be an alveolar round-celled sarcoma. A few days later I amputated the middle of the forearm. Four weeks later there was a general recurrence and death followed six weeks later.

This is a striking example of acute traumatic malignancy, because the tumor appeared almost immediately after the injury in a person ab-

solutely healthy before the injury. (This case has already been reported as one of the very few cases on record of sarcoma of the metacarpal bone.)

CASE II.—Sarcoma of the Spine.—L. P., female, aged twenty-six years. Always well, without history of heredity. In 1889 the patient fell from a hammock, striking upon the dorsal region of the spine. One year later she noticed a small swelling in the same region, in exactly the line of the spinous processes. This was at first regarded as tubercular, but it increased in size, and was excised under ether by Dr. W. T. Bull. The pathologist's report showed it to be a mixed- (round and spindle) celled sarcoma. The disease quickly recurred, and a second and third operation was performed within a short time. The tumor grew to enormous size, and the patient died one year later.

CASE III.—Melanotic Sarcoma of the Thumb.—W. J. W., male, thirty-seven years of age. Perfectly well, with a marked hereditary history of cancer, three of his father's brothers having died of malignant disease, one of sarcoma of the shoulder, the other two of cancer of the tongue. On December 7, 1892, the patient injured his left thumb by getting it caught in a heavy office curtain; it immediately became swollen and painful. The swelling not subsiding, it was lanced on January 15, and some pus evacuated. It continued red, swollen, and painful, and the root of the nail gradually became dark-colored. On the 15th of May a piece of tissue was examined microscopically, and found to be melanotic sarcoma, round-celled. The thumb was amputated by Dr. L. L. McArthur, of Chicago, on June 6. *Subsequent History:* October 1, a small, subcutaneous recurrence appeared in the forearm. Others followed in quick succession; during the next year more than 200 similar tumors were removed. The patient died in December, 1895. (This case was treated by Dr. Bull and myself with the erysipelas toxins with little benefit.)

CASE IV.—Mixed- (Round and Spindle) Celled Sarcoma of the Ovary.—M. B., female, seven and a half years old. Good family history. In September, 1894, fell, striking hard upon the abdomen. A tumor in this region was noticed early in December, or about ten weeks after the injury. Operation was performed on December 27, 1894, by Dr. J. B. Deaver, of Philadelphia. A tumor nearly as large as a child's head was removed, apparently originating in the left ovary. Seven months later there was a recurrence, and the tumor grew with great rapidity; a second operation was performed, with the result of a recurrence six months later. The patient was treated at the New York Cancer Hospital, in March, 1896, for three weeks with the toxins of erysipelas, with the result of a considerable decrease in the size of the tumor. In April, 1896, she developed typhoid fever, and died six weeks later.

CASE V.—Sarcoma (Cylindroma) of Breast.—S. B., fifty-five years of age. Mother died of cancer at the age of sixty-seven, and grandmother died of a cancer of the uterus. The patient received a severe blow to the right breast in August, 1893, falling forward in an omnibus

against the sharp end of an umbrella. One week later she noticed a contraction in the tissues at the site of the injury. Five or six weeks later a small bloody discharge appeared at the nipple. The induration and discoloration slowly increased, and in the following February, or five months later, the entire breast and axillary glands were removed. Recurrence quickly followed. During the next two years five or six other operations were performed for small local recurrences. Death followed shortly after an operation in August, 1896.

CASE VI.—Sarcoma of the Testis.—T. B., male, aged twenty-five years, received an injury to the right testis in 1890. Two years later a tumor developed in the right testis, and this was removed by operation. One and a half years later the disease returned in the iliac fossa, behind the cæcum. The patient rapidly lost flesh and strength, and died about six months later. The physician, who was present at the time of the operation of the testis, stated that the tumor was examined microscopically and pronounced by the pathologist tuberculous. This diagnosis must have been a mistake for a round-celled sarcoma, as was proven by the subsequent course.

CASE VII.—Sarcoma of the Popliteal Space.—T. C., male, eleven years of age, with good family history, had his left leg run over by a wagon six years ago. Four years later he fell from the top of a pile of wood, striking his leg in the popliteal region hard against a stick of wood which was standing upright. Pain and more or less stiffness remained ever since the injury, but no tumor was noticed until November, 1896, about one year after the injury. The swelling increased rapidly in size, and the pain, which extended as far as the hip, became excruciating, keeping the patient awake at night. In February, 1897, a swelling was noticed in the iliac fossa on the same side. I first saw the patient in June, 1897. Both leg and thigh were moderately flexed; motion limited. The tumor in the iliac fossa was about the size of an orange, and not connected with the bone. A portion of the tumor in popliteal region was removed for examination, and proved to be large round-celled sarcoma. The patient was treated for a few weeks with the toxines of erysipelas, but with little result.

CASE VIII.—Angiosarcoma of the Breast.—A. C., female, aged fifty-nine years, with a good family history, seventeen years ago received a blow upon the left breast from a small boy. Three months later, at the site of the injury, there appeared a small lump which grew slowly and was moderately painful. At the end of three years it had reached the size of a fist, and was removed by operation. The patient remained free from disease for seven years, when a local recurrence followed. Two years later she was operated upon a second time. Two years later another recurrence followed, and when first seen by myself, January 20, 1895, there was a large inoperable sloughing tumor occupying the entire region of the left breast from the axillary line to the sternum. The tumor diminished markedly under the erysipelas serum and toxines, and the patient's general health improved. In September, 1895, the remaining mass was removed under ether, and when last seen, six months later, the patient was in good condition.

CASE IX.—Round-Celled Sarcoma of the Arm.—P. F., female, forty-one years old, with a good family history, injured her right arm with a rake-handle three years ago. Two years later, at the site of the injury, on the outer surface in the middle of the right arm, there appeared a small tumor, which grew to the size of a duck's egg, and was operated upon in May, 1894. Between this date and November, 1895, eight operations were performed, speedy recurrence following each operation. The erysipelas toxines were tried for a short time without success. On February 17, 1896, with the assistance of Dr. William T. Bull, I amputated the arm to the shoulder-joint. The patient did not rally well from the shock of the operation, and died on the third day.

CASE X.—Multiple Sarcoma.—M. F., female, aged forty-six years, with good family history, had a congenital mole upon the neck. This remained stationary until eight years ago, when it was scratched. It immediately began to increase in size, and when about as large as a hickory-nut, an attempt was made to remove it by a silk thread. Five years later a hard lump formed underneath the scar and grew slowly. This was thoroughly removed by operation. One year later a tumor developed in the axillary region on the same side. Two other tumors soon after appeared in the left buttock, one growing rapidly, the other remaining stationary. In August, 1895, there was a tumor, the size of a fist, just under the right breast attached to the skin, but apparently not connected with the breast gland; it was of a deep purple color. In the left buttock there was a similar tumor about the size of a cocoanut. This was probably a melanotic sarcoma.

CASE XI.—Sarcoma of the Cheek.—J. H., female, eight years old, with good family history. Always well. Sixteen months ago she noticed a hard tumor over the upper part of the left cheek-bone. Six weeks prior to this time the mother had severely slapped the child in this region. The first operation was performed in April, 1894, at the Long Island College Hospital. Six operations were performed in rapid succession; at the last the jaw was removed by Dr. George R. Fowler. Recurrence quickly followed, and at the time of my examination (April 12, 1895) the whole face and side of the head were extensively involved. The tumor was undoubtedly round-celled. No treatment was advised.

CASE XII.—Sarcoma of the Mastoid.—M. H., male, forty-three years of age, with good family history. Six years ago received a severe blow over the right ear, knocking him down. Four and a half years later he noticed a discharge from this ear with headache localized upon that side. A short time afterwards a swelling appeared near the external auditory meatus, later over the mastoid. Several operations were performed with the result of a speedy recurrence each time. When the patient came to me for examination the condition was hopeless.

CASE XIII.—Sarcoma of the Palm of the Hand.—J. M., female, aged twenty years. Two years ago fell, striking upon the palm of her right hand. About one year later, in July, 1895, she noticed a small swelling at the site of the injury. In October this was removed by operation, but it quickly recurred. A second operation was performed by Dr.



FIG. 1. —Sarcoma of breast immediately following injury. *Vide* Case XV.

Edward Martin, of Philadelphia, in January, 1896. Microscopic examination of the primary tumor showed it to be a mixed- (round and spindle) celled sarcoma, apparently starting in the sheaths of the tendon. The tumor quickly recurred after the second operation. When first seen by myself, on February 15, 1896, there was a mass about one and a half to two and a half inches long in the centre of the palm. The patient was treated about six weeks with the mixed toxins of erysipelas, with the result that the tumor entirely disappeared. The patient is at present—November, 1897—in good condition. On January 29, 1898, there was a slight thickening in the palm at site of the old cicatrix. Incision under ether showed a slight thickening about the flexor tendon of the middle finger. Some of this was removed, but the pathologist was unable to state whether it was sarcomatous or not.

CASE XIV.—Sarcoma of the Breast.—M. M., female, aged thirty-one years, unmarried, with good family history, struck her breast against an iron bracket while acting as clerk in a dry-goods store. She noticed a swelling immediately after the injury, and this continued to increase in size. Five months later the tumor was removed by operation, recurrence quickly following; four months from the first a second operation was performed. The patient died eighteen months after the injury, from a supposed recurrence in the brain, five operations having been performed in the mean time. This case was operated upon by Dr. B. Gallaudet and Dr. William T. Bull; it was not seen personally by myself. It is of interest as it has an important bearing on the following case.

CASE XV.—Sarcoma of the Breast.—A. M., female, aged thirty-one years, a sister of the preceding case. The patient had always been in perfect health until August, 1896, when she received a blow upon the right breast. A few days afterwards she noticed a lump at exactly the site of the injury. This grew rapidly, but it was not painful until November. In December, 1896, it became exceedingly painful and was growing with great rapidity. She consulted a physician, who advised internal treatment. On February 8, 1897, I saw her in consultation with Dr. William T. Bull. At this time the entire right breast was occupied by a spheroidal tumor about the size of a large cocoon, markedly protuberant, slightly fixed to the chest wall, not involving the axillary glands. The skin was thin and glossy, and of a deep purple color over the most protuberant parts. (See Fig. 1.) The tumor grew with enormous rapidity and soon began to slough. The patient died of exhaustion in April, 1897, or seven months after receipt of the injury. It is of interest to note that in these two sisters the sarcoma developed immediately after an injury in both cases, the tumor occupied the right breast in both instances, and both were just thirty-one years of age at the time when the tumor developed.

CASE XVI.—Sarcoma of the Femur.—J. N., female, aged eleven years, with good family history, had always been perfectly well until February, 1897, when she fell down a flight of stone steps striking upon the left knee. Pain and swelling immediately followed and continued to increase. Three months later a well-marked tumor was noticed just

over the outer condyle of the left femur. This grew rapidly and soon began to affect her general condition. Examination on July 28, 1897, or five months after receipt of the injury, showed the lower end of the right femur greatly enlarged, its circumference being sixteen inches while the corresponding measurement on the other side was ten inches. (See



FIG. 2.—Sarcoma of the femur following immediately an injury. *Vide* Case XVI.

Fig. 2.) I amputated the hip-joint on the 31st of July at the Post-Graduate Hospital without previous exploration. The patient made a good recovery. Microscopic examination showed it to be a spindle-celled sarcoma. (See Fig. 3.)

CASE XVII.—Alveolar Sarcoma of the Femur.—S. R., female,

twenty-six years of age, with good family history. Two years ago, when making a false step, dislocated the right patella; this was put back under ether; knee remained more or less stiff, but no tumor was noticed until three months ago, when a swelling appeared just above the condyle on the inner side. A portion was removed under ether, and on examination proved to be alveolar sarcoma, composed principally of round cells. In April, 1896, two weeks after exploratory incision, I amputated the leg at the junction of the middle and upper thirds of the thigh. Examination of the inguinal gland showed there was no involvement. In July there was a well-marked recurrence in the soft parts of the stump, and shortly afterwards unmistakable evidence of sarcoma in the lungs. Death followed in September, 1897.

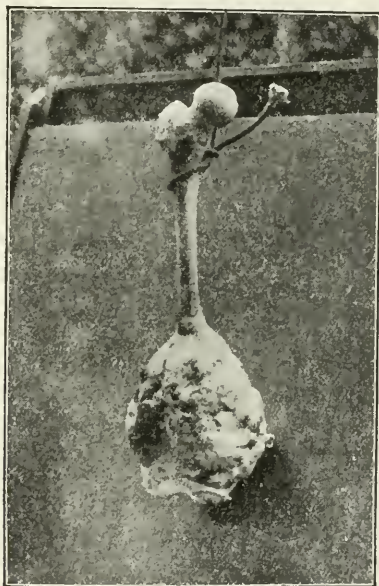


FIG. 3.—Sarcoma of the femur after removal. *Vide Case XVI.*

CASE XVIII.—Spindle-Cell Sarcoma of the Thigh.—M. G., female, forty-eight years old. Five years ago slipped and strained the muscles of the left thigh. Two years later there appeared on the outer aspect of the left thigh, near the site of the previous injury, a small tumor which grew to the size of a fist; this was removed in March, 1896, by Dr. William T. Bull, at the New York Hospital; it was impossible to remove the entire tumor, and there was evidence of involvement of the inguinal glands. The whole leg was markedly œdematous, and the patient was unable to get about. Microscopic examination showed the tumor to be spindle-celled sarcoma. She was treated for about three months with the mixed

toxines of erysipelas and bacillus prodigiosus, at the New York Cancer Hospital, with the result that the tumor entirely disappeared, both in the thigh and the groin. At present, October, 1897, she is apparently free from recurrence.

CASE XIX.—Round-Cellled Sarcoma of the Testis following Bicycle Injury.—G. S., male, twenty-nine years of age, with good family history, always perfectly healthy, received an injury to the left testicle from a bicycle fall in August, 1896. A swelling appeared in the testis in September and increased rapidly in size. The first operation was performed in June, 1897, by Dr. Millbach, of Albany. Speedy recurrence in the cord and inguinal glands followed. Four operations have been since performed, two by myself. The erysipelas toxines were tried for three or four weeks without effect. The tumors recurred and present conditions hopeless.

CASE XX.—Round-Cellled Sarcoma of the Testis following Bicycle Injury.—E. K., male, twenty-two years old, good family history; previously in perfect health. On attempting to learn to ride a bicycle, July 1st, 1896, he fell and injured the left testis. Within one week after he noticed an increase in size; the increase continued, but the growth was not painful. In August, 1896, it had reached the size of a fist. In May, 1897, the patient was operated upon and the tumor removed. Recurrence followed in May. A second operation was performed in June, 1897. There quickly followed abdominal recurrence; the patient lost flesh and strength very rapidly, and died early in October, 1897. Autopsy showed nearly all the abdominal organs extensively involved. After generalization had occurred the erysipelas toxines were tried ten days with little effect; only very small doses could be borne.

CASE XXI.—Sarcoma of the Axilla.—P. W., female, aged twenty-seven years, with good family history, cut her hand upon a flower-vase three years ago. The hand was kept bandaged for two weeks. During this time a lump appeared in the axillary gland of the same side. This lump never disappeared, but slowly increased in size and at times was quite painful. Later on two other similar tumors appeared, and finally the three coalesced, forming one, the size of an orange. In January, 1896, the patient was operated upon by Dr. A. J. McCosh, of the Presbyterian Hospital. It was found impossible to remove the entire tumor. The growth subsequent to the operation was exceedingly rapid, and the tumor soon involved the clavicle and portion of the scapula. Microscopic examination showed the tumor to be round-celled sarcoma.

CASE XXII.—Sarcoma of the Parotid.—W. M., male, fifty-six years of age; farmer; had always been well; no history of heredity. In the latter part of July, 1895, he received a blow in the right parotid region from a horse's head, the horse turning suddenly while he was standing near him. One month later a small tumor, about the size of a hazel-nut, appeared at the site of the injury. This was removed under cocaine on October 6. The tumor recurred almost immediately. A second operation was performed on the last of October. On November 13 the tumor had recurred again, and reached the size of half an egg, involving the

soft parts in the region of the parotid, but was not attached to the bone. A very thorough removal was made under ether anæsthesia, but in spite of this in less than three weeks the tumor had recurred, and reached the size of half an orange. Microscopic examination showed the growth to be made up of mixed (round and spindle) cells, the round predominating. He was treated with the mixed toxines of erysipelas without result. This case is important as the tumor appeared within a few weeks after receipt of the injury. Four operations were performed within the following four months, showing a very high degree of malignancy.

CASE XXIII.—Round-Celled Sarcoma of the Calf of the Leg.—M. M., female, eleven years old, in the spring of 1895 had a fall, injuring her ankle and leg. In July of the same year, about three months later, there appeared a tumor in the calf of the leg, apparently beginning in the muscles or fascia. The growth increased very rapidly, but was but slightly painful. Examination in August, 1895, or one month after the disease was first noticed, showed the right leg occupied by a tumor involving almost the entire circumference, but most prominent in the calf. The circumference at the most prominent portion was three inches larger than the corresponding measurement on the left leg. A portion of the tumor was removed by means of a Mixter punch, and examination showed it to be a small round-celled sarcoma of great vascularity. Amputation of the leg was strongly urged, but operation was refused by the parents.

CASE XXIV.—Sarcoma of the Ribs and Pleura.—J. M., male, aged fourteen years, with no family history; personal history good until July, 1895, when he injured the right side of his chest. In January, 1896, or six months later, there was first noticed a lump, which seemed to be attached to the ribs on the right side just below the nipple. This increased in size, and was operated upon by Dr. F. S. Dennis in March, 1896. Two ribs were resected, and the growth was found to involve the pleura as well; it could not be thoroughly removed.

CASE XXV.—Sarcoma of the Parotid.—J. S., male, aged fifty-three years, met with an injury in the right parotid region fifteen years ago. Five years later a small swelling appeared at the site of the injury; this remained nearly stationary for about eight years; two years ago it began to show increase in size. One year ago slight facial paralysis developed. In April, 1897, the tumor—which was then the size of a small egg—was removed by Dr. Maurice H. Richardson, of Boston. Microscopic examination showed the growth to be a mixed-celled chondrosarcoma. It promptly recurred, and on June 24, 1897, a second operation was performed and the infected cervical and supraclavicular glands were removed. In September, 1897, there was well-marked evidence of recurrence in the neck and supraclavicular region.

CASE XXVI.—Sarcoma of the Iliac Fossa.—Retroperitoneal; probably Osteosarcoma of the Ilium.—E. S., male, fourteen years of age. Family history good. One and a half years ago was dragged under a trolley car and suffered contusions about the pelvis. In January, 1897, about one year after the injury, there was noticed a slight fulness in the

right groin. In February severe pain in the region of the right hip-joint set in; this was at first thought to be due to rheumatism. The patient rapidly lost flesh and strength, and the hip-joint became more and more fixed. In March, 1897, he was examined by his attending physician, Dr. G. H. Davis, of Brooklyn, who detected a tumor filling up the right iliac fossa, apparently starting from the ilium. Pain at this time was very severe and constant. On March 29, exploratory laparotomy was performed by Dr. George F. Fowler, of the Brooklyn Hospital. A vascular tumor was found filling up the right iliac fossa and extending backward to about three inches above the crest of the ilium and Poupart's ligament. No specimen was removed for examination as the diagnosis seemed beyond doubt, and as the case was clearly inoperable the wound was closed. The case seemed entirely hopeless, and a trial with the toxines of erysipelas was suggested, but in view of the large size of the tumor and the weakened condition of the patient almost no encouragement was given. The mixed toxines were begun in small doses on April 10, 1897. The patient was extremely emaciated and had marked cachexia; he had lost about thirty pounds in weight within three months. The thigh was flexed upon the abdomen and nearly fixed. Rapid improvement followed the injections, and at the end of three weeks the patient was able to walk about the room; he had gained about ten pounds. Examination showed the tumor had almost entirely disappeared. The improvement continued, and within two months after the treatment was begun he had recovered practically all of his lost weight, and no evidence of the tumor could any longer be detected. In the early part of October, 1897, a fluctuating swelling appeared posteriorly over the centre of the gluteal region. This was opened under ether and about one ounce of broken-down tissue was removed; no dead bone could be detected. Examination of the material removed was negative. It is probable that this was the remains of the degenerated sarcomatous tissue which, following the line of least resistance, had worked its way backward and collected in the region where it was found.

CASE XXVII.—Round-Celled Sarcoma of the Femur.—Periosteal.—H. G., male, aged twenty-six years, with good family history, first noticed a swelling in the lower end of the femur in September, 1895. He had sprained his knee two months before while attempting to separate two large dogs engaged in a fight. The lameness and stiffness appeared at once, and it remained until the tumor was noticed, a few weeks later. Exploratory incision showed the tumor to be round-celled sarcoma, and a few days later amputation of the leg to the hip-joint was performed by Dr. William T. Bull. The tumor recurred in the stump and pelvis in March, 1896, and the patient died about five months later.

CASE XXVIII.—Mixed-Celled Sarcoma of the Thigh.—M. B., male, fifty-five years old, first noticed a small tumor in the lower outer aspect of the left thigh, situated in the soft parts not attached to the bone. The patient had received a gunshot wound in the neighborhood of the tumor twenty-five years before. The growth was removed two or three times,

each operation being followed by rapid recurrence, and finally the thigh was amputated, in 1893.

CASE XXIX.—Round-Cellled Sarcoma of the Breast.—F. H., female, aged twenty-seven years, with good family history, gave birth to a child in September, 1890; no inflammatory trouble of breast. Soon after confinement the attending nurse accidentally applied carbolic acid, causing a severe burn covering an area six by three inches. Soon after this had healed, about three months later, a small tumor appeared and grew very rapidly. This was removed, by operation, in February, 1892, having then reached the size of a silver dollar. The disease soon recurred and grew rapidly so that within a short time the entire breast was involved. A second operation was performed in April, 1892, the entire breast and axillary glands were removed. Microscopic examination showed the growth to be a small round-celled sarcoma.

CASE XXX.—Osteosarcoma of the Left Shoulder.—J. B., male, thirty-six years of age, received an injury to the left shoulder in November, 1890, supposed to be a dislocation. He had more or less pain ever since the injury. In June, 1891, he noticed an enlargement of the shoulder, increase of pain, and diminution in mobility. Physical examination showed an elastic swelling, the size of a child's head, marked dilatation of the superficial veins. The tumor apparently started in the upper end of the humerus.

CASE XXXI.—Chondrosarcoma of the Ischium.—M. S., female, aged thirty years, with good family history, in 1886 fell, injuring the ischium. Considerable pain developed almost immediately after the injury; pain increased, and three months later a swelling appeared the size of a hand. This slowly grew for four years, and then was removed by operation. The growth recurred shortly after the operation but grew slowly, gradually involving a considerable portion of the ilium. In 1894, four years after the first operation, the growth measured thirty-four inches at its base and was very markedly protuberant. It was a mixed chondrosarcoma with the cartilaginous type predominating.

CASE XXXII.—Osteosarcoma of the Lower Jaw.—H. D., female, aged thirty-eight years, received a slight injury to the lower jaw in June, 1893. Teeth had been extracted several years prior to this date. Two weeks after the injury a swelling appeared at the site of the injury in the region of the first molar tooth; there was little pain. The tumor gradually increased in size, and in November was removed by Dr. A. Vanderveer, of Albany, a portion of the jaw being resected. About three months later the tumor recurred, soon involving nearly all the structures on the left side of the face.

CASE XXXIII.—Sarcoma of the Conjunctiva of the Eye.—J. J., male, twenty-nine years old, with good family history, in 1887 received a scratch from a finger-nail upon the conjunctiva of the left eye. A tumor very quickly developed at the site of the injury. Six operations were performed within one year, and at the last, on March 11, 1888, the eye was removed. Not long after the tumor had appeared in the eye a swelling in the parotid of the same side was noticed. This swelling entirely

disappeared under an attack of measles, but in April, 1893, a tumor appeared in the same region; this was moderately painful, steadily grew in size, and on November 2, 1893, was removed by operation at the New York Hospital. The pathologist's report pronounced it fibrosarcoma. The tumor recurred about a year later locally. Several other operations were performed without success. The patient was treated for a time with the erysipelas toxines with temporary improvement. Later the injections failed to control the disease.

CASE XXXIV.—Round-Celled Sarcoma of the Ball of the Foot.—M. R., male, fifty-five years old. About a year and a half ago a small sore formed on the ball of his foot, owing to a nail projecting from the shoe. This partially healed from time to time, but there always remained an area of induration about the original injury; this, however, was so slight that the patient thought nothing of it. About two months ago a swelling appeared in the right groin. This was partially removed by operation, by Dr. J. C. Minor, in April, 1896. Microscopic examination showed it to be a very vascular round-celled sarcoma. The disease grew very rapidly, and in a few weeks involved the internal organs, causing death within three months from the operation. At the autopsy the indurated area in the ball of the foot was removed, and microscopic examination showed it to be round-celled sarcoma, with considerable pigmentation (melanotic) in the primary tumor. While the injury in this case could not be called single, yet the irritation from the nail was probably not of more than a few days' duration and was sufficient to cut through the skin and cause an ulcer. Another interesting feature in this case is the fact that the trouble in the foot seemed so insignificant that, when the tumor developed in the groin, the patient had forgotten the lesion in the foot; only careful inquiry elicited the fact that any trouble existed there.

CASE XXXV.—Spindle-Celled Sarcoma of the Parotid.—W. L., aged forty years, male, carpenter by occupation. An aunt died from malignant tumor of the breast, which had developed after an injury. In September, 1896, the patient received a slight injury in the left parotid region. Early in 1897 a swelling developed, and the first operation was performed in March, 1897; a second and a third operation was done in April, by Dr. Wright, of Bridgeport, Conn. It was found impossible to remove the entire tumor; the growth subsequent to the operation was very rapid. From August 10 to October 15, 1897, the patient has been under treatment with the erysipelas toxines at the Post-Graduate Hospital, with the result that the growth entirely disappeared, and the patient at present, January 20, 1898, is perfectly well. The diagnosis was confirmed by microscopic examination.

CASE XXXVI.—Round-Celled Sarcoma of the Femur, following Fracture.—E. P., female, aged five years, was admitted to the Hospital for Ruptured and Crippled on April 2, 1895, with a rapidly growing round-celled osteosarcoma of the middle of the femur. There was no family history of malignant disease. About two years ago the child had fractured the thigh and been slightly lame since. No tumor was discovered until six

months ago, when a swelling appeared in the region of the old fracture. The swelling was accompanied by considerable pain, and examination at the time of her admission to the hospital showed a hard, fusiform swelling just below the middle of the right thigh, apparently starting in a bone or periosteum. The circumference at the site of the greatest enlargement was two inches larger than that of the other thigh. There was no glandular involvement. A portion of the tumor was removed by a Mixer punch. Microscopic examination showed the growth to be a small, round-celled sarcoma. The patient was treated with the mixed toxines for two weeks with no improvement, and on May 8, 1895, amputation at the hip-joint was performed by Dr. William T. Bull. On September 3 there was evidence of recurrence in the iliac fossa, and the child soon began to emaciate rapidly and develop jaundice and other unmistakable signs of involvement of the abdominal organs. Death December 7, 1895. No autopsy.

CASE XXXVII.—Round-Celled Medullary Sarcoma of the Upper End of the Tibia.—T. G., male, aged twelve years, was admitted to the Hospital for Ruptured and Crippled on December 12, 1895, with the following history: Two weeks prior to admission to the hospital he had fallen upon the sidewalk and injured the upper portion of the leg, at the site of the swelling. There was considerable pain. Hot applications and liniment were applied. At the time of admission to the hospital the leg was flexed to an angle of 110 degrees, and motion was considerably limited. There was present a hard tumor in the upper end of the tibia, slightly fluctuating over a small area, apparently starting from the centre of the bone but not communicating with the joint. Circumference of the leg in the region of the swelling was one inch greater than the corresponding measurement on the other side. Microscopic examination of a portion of the tumor, removed with the Mixer punch, showed the tumor to be a round-celled medullary sarcoma. The case was treated for two or three weeks with the mixed toxines of erysipelas and bacillus prodigiosus without any apparent improvement. Amputation at the middle of the thigh was then performed by Dr. V. P. Gibney.

CASE XXXVIII.—Sarcoma of the Tonsil.—Mrs. W., aged seventy-three years, without family history of malignant disease and with good previous personal history. On October 6, 1897, while lying down, was grasped about the throat by a small boy and the neck suddenly twisted. Five days later the patient noticed a swelling and soreness in the region of the right tonsil. The swelling continued to increase very rapidly, and one month later a portion of the tumor was removed and pronounced sarcoma on microscopic examination. Physical examination on November 12, five weeks after the injury, showed the right tonsil and pharynx enlarged to about the size of an egg, ulcerated over its most projecting portion, so completely blocking up the pharynx that respiration and deglutition were exceedingly difficult. General condition very poor.

CASE XXXIX.—Round-Celled Sarcoma of the Tibia.—R. O'C., male, twenty-eight years of age. One and a half years ago, on going upstairs, fell against a step, injuring the upper portion of his tibia; a

short time after that he met with another fall, injuring himself in the same region. About six months ago he began to notice an enlargement in the upper end of the tibia, at the site of the injury. This slowly increased in size, and the last few months has caused slight lameness. Exploratory operation was performed in the latter part of September, 1897, at the Massachusetts General Hospital, and a portion removed. Examination showed the specimen to be round-celled sarcoma. The patient was referred to me by Dr. Maurice H. Richardson, of Boston, for a short trial with the toxins before resorting to amputation. The mixed toxins were used for three weeks with no apparent benefit. Physical examination, in October, showed slight enlargement over the upper end of the right tibia, not communicating with the joint. The tumor was of central origin, but over the middle of the anterior portion the bone had become so thin as to give a slight sense of fluctuation,—a peculiar crackling sensation characteristic of central osteosarcoma. The tumor was exceedingly vascular, and could not be scooped out without running serious risk of a fatal hæmorrhage. Amputation just above the condyles was advised, and performed on November 13, 1897, at the Post-Graduate Hospital. The patient made a good recovery.

CASE XL.—Spindle-Celled Sarcoma of the Foot (Metatarsal Bone).—F. K., female, aged sixteen years, in 1888 had a fall, injuring the right foot. Shortly afterwards two lumps appeared on the foot in the region of the injury, and in 1889 the patient was operated upon in the New York Hospital, by Dr. William T. Bull. The third and fourth metatarsal bones were removed. Three years later she received another injury at the foot, and a short time afterwards a recurrence was noticed. Syme's amputation was then performed by Dr. Bull. In 1893 she fell downstairs, injuring the stump, and shortly after this a lump appeared on the outer aspect of the stump and slowly increased in size. Soon afterwards a tumor appeared in the popliteal space, and grew with great rapidity until, in December, 1893, it had reached the size of a child's head, and was then removed by Dr. Bull. The small tumor in the stump was treated by Dr. Bull and myself with the mixed toxins of erysipelas, with the result of entire disappearance. About one and a half years later there was a return in the same locality, and in 1896 I amputated the leg just above the middle of the thigh. There have been two recurrences in the gluteal region, which have been removed by operation. The patient has had the toxins administered at intervals during the past three years. She is at present in good health.

CASE XLI.—Round-Celled Sarcoma of the Clavicle.—E. S., male, twenty-one years old. In May, 1893, the patient broke his left clavicle. One year afterwards a swelling appeared at the site of the fracture and grew rapidly. The clavicle was partly removed by operation, but the disease quickly returned, soon involving the scapula. The patient was treated with the toxins of erysipelas for about four weeks without success. Excision of the remaining portion of the clavicle, the entire scapula, and upper extremity was later performed by Dr. W. W. Keen, of Philadelphia. The patient made an excellent recovery from the operation, but died about eight months after the operation from recurrence.

CASE XLII.—Round-Celled Sarcoma of the Tibia.—S. L., female, twenty-four years of age; family history good; previous personal history contained nothing worthy of note. In 1895 the patient fell down stairs and injured the upper part of the right tibia. A swelling in the region of the injury quickly followed and was accompanied by considerable pain. The trouble slowly grew worse. For a number of months it was treated as a periostitis, and later was regarded as an osteitis. The swelling slowly increased as well as the pain. A portion of the growth was removed for microscopic examination. The latter proved it to be a round-celled melanotic sarcoma. On August 27, 1896, I amputated at the junction of the middle and lower thirds of the thigh. (In this case the tumor developed immediately after receipt of the injury.) The subsequent history I have been unable to trace.

CASE XLIII.—Sarcoma of the Kidney.—J. C. S., male, aged fifty years; German; perfectly well until March, 1893, when he fell down a flight of stone steps severely injuring the back just over the right kidney. About six months later hæmaturia developed. On the 1st of December of the same year a tumor could be made out in the region of the right kidney; operation was performed by Dr. F. Lange. The kidney was removed, the pleural cavity opened, and a portion of the twelfth rib resected. The patient was in the hospital for six weeks. He remained perfectly well for nearly four years after that, till March, 1897, when he had an attack of grippe, which left him with some bronchial irritation. In May, 1897, while taking a cycling trip, he had slight dyspnœa and considerable pain in the region of the old cicatrix. On July 5, 1897, a swelling was first noticed in the region of the old scar; this has rapidly increased in size since, until at present (November 24, 1897) physical examination shows a tumor in the right lumbar region, extending from the crest of the ilium upward to the free border of the ribs, a distance of five inches. Transverse semicircumference of the tumor is six inches. The tumor occupies the site of the kidney, projecting somewhat beyond the level of the surrounding tissues, and is fairly well fixed. The skin over it is normal in appearance and not adherent. The patient has lost about ten pounds in weight and is in fairly good condition. There is no clear evidence of invasion of the pleural cavity. The erysipelas toxines were tried three weeks without result.

CASE XLIV.—Melanotic Sarcoma of Foot.—J. H., female, aged thirty years; family history good. Had had a small movable swelling about the size of a dime on dorsum of left foot since childhood. It was not dark-colored and caused no inconvenience, until about three years ago, when the patient met with the following injury: While walking over a sidewalk undergoing repairs, her husband, preceding her, stepped upon a loose plank, causing the rear end to rise up two or three inches. Against this plank she struck her left foot, and shortly after, a week or two, she noticed the small lump was increasing in size. In a few months she had to get larger shoes, and the lump began to grow dark-colored. Ten months ago a tumor appeared in the groin, and this increased more rapidly than the tumor in the foot. She was admitted to the New York

Hospital November 15, 1897, and the tumor of foot removed by Dr. Bull. The tumors of groin and pelvis were inoperable. The microscopic examination showed the growth to be a spindle-celled melanotic sarcoma with a great abundance of pigment. Dr. Bull transferred the case to my service at the New York Cancer Hospital for a trial of the mixed toxins. The patient was weak and had a daily temperature of 102° or 103° F., and only small doses of the toxins were given for two weeks. No effect was visible on the tumors. Two months later she developed spinal paraplegia.

CASE XLV.—M. C., female, aged fifty years; family history good. Patient had had a small, dark-colored congenital mole on outer aspect of left leg since infancy. In June, 1897, she scratched this, causing it to bleed. Almost immediately afterwards it began to grow. A short time later the tumor was excised. Speedy recurrence followed, both locally and in the upper portion of the thigh. The tumors grew with great rapidity, and on February 1, 1898, were entirely beyond operation. They were deeply pigmented.

NOTE.—This interesting case was observed since the paper was read.

CASE XLVI.—Osteo-Chondrosarcoma of Ilium.—B. M., male, aged twenty-three years; family history good, and patient in good health up to February, 1893, when a hard tumor was first noticed in the right buttock, attached to the bone. Ten years before he had fallen four stories, and again two years before he fell upon the sidewalk, striking upon his back. When seen by myself, February, 1894, he had a very large (size of child's head), inoperable sarcoma of the ilium, and general health was much impaired. The tumor entirely disappeared under one month's treatment of the erysipelas toxins, and he remained well for seven months. Recurrence (local) followed, and he died in July, 1896.

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¹² Leopold and Maas: Aetiologie des Geschwülste, Berliner klinische Wochenschrift, 1880, 47. ¹³ ANNALS OF SURGERY, November, 1897.

For the very complete literature of the subject, consult Löwenthal's article (*loc. cit.*), giving 360 references.

A STUDY OF TWENTY-NINE CASES OF CANCER OF THE BREAST SUBMITTED TO OPERATION.¹

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Efficacy of Operation for Breast-Cancer.—The efficacy of this operation has increased together with the general surgical progress of the last few years. In 1878, von Winiwarter (*Beiträge zur Statistik der Carcinome*, Stuttgart, 1878) reported upon 170 cases of carcinoma of the female breast observed by Billroth between 1867–76; 143 were operated upon, with a mortality of 34, or 23.7 per cent.; 82 per cent. of the remainder, whose subsequent history was known, had recurrences; 8.3 per cent. of those whose operations antedated the report by three years or more were alive and free from recurrence or metastasis.

The rapidity of recurrence in these earlier cases may be indicated by the combined statistics of 203 operative cases reported by von Winiwarter and Oldekop (*Archiv für klinische Chirurgie*, Band xxiv, p. 579), in whom thirty-nine recurred within fifteen days, and fifty recurred within one month.

An indication of the progress of the succeeding seventeen years is furnished in Curtis's paper (*New York Medical Record*, February 24, 1894, p. 228), in which he summarizes the results from 1213 cases, which had been reported between 1888 and 1893 in European clinics. The mortality

¹ Read before the Surgical Section of the New York Academy of Medicine, November 11, 1897.

was 5.9 per cent., and among the 813 cases, whose subsequent history had been followed, 22 per cent. remained free from recurrence or metastasis for three years or more.

Since that time there have been some notable contributions to the subject, which may be tabulated as follows:

Operator and Reference.	Number of cases whose subsequent history could be followed.	Number alive and free from recurrence three years after operation.	Percentage.
Bull: New York Medical Record, 1894, Vol. ii, p. 223.	75	20	26.6
Rotter: Berliner klinische Wochenschrift, 1896, Nos. 4 and 5.	10	5	50.0
Helferich: Deutsche Zeitschrift für Chirurgie, 1896, Vol. xlv, 101.	35	10	28.6
Cheyne: Lettsonian Lectures, 1896. . .	21	12	57.0
Dennis: System of Surgery, 1896, p. 931.	38	17	45.0
May: British Medical Journal, 1897, Vol. i, p. 1269.	20	7	35.0
Total	199	71	39.6

This remarkable showing of 199 cases with 39.6 per cent. of cures, reckoned on the three years' basis, surely indicates a great advance in the efficacy of the operation.

It also indicates that cases are now brought to the surgeon before the growths are so far advanced as they used to be.

The mortality from the operation has also diminished most remarkably. Weir (*New York Medical Record*, December, 1892, p. 752) has reported 125, and Halsted and May each seventy-six consecutive operations without a single death. Dennis has operated upon seventy-four cases, with only one death, and that from hæmophilia, and Cheyne has operated upon sixty-one cases, with only one death, with which, probably, the ether had as much to do as the operation.

The cases here reported number twenty-nine, operated

upon since March, 1893. In only six instances were the operations more than three years ago. Three of these cases are alive and well, and have been busily occupied during this time; they have no visible recurrence. One of the three had two or three small nodules removed from the axilla in another city about six months after her operation here. I do not know their nature,—at the publication of this paper,—three years have elapsed since this second operation. The fourth case has also had good health since the operation, but has just developed at the termination of the three years a small spot of induration at the margin of the cicatrix. The other two died of lung-disease, which was apparently cancerous; one twenty-two and the other two and one-half months after operation; they had no local recurrences. These six cases are not cited as showing what can regularly be expected from operation for cancer of the breast. The number is too small to furnish material for deductions. They are simply related to add another slight contribution to the great mass of evidence which is accumulating to show the efficacy of the operation. I had expected to include two other cases in the number of those who had lived for more than three years, but cannot do so on account of the failure to find a pathological report from the specimens. One lived three years and died with evidence of pulmonary metastasis. The other was living at the lapse of three years, but I am unable to find the present address of herself or her friends. These cases were operated upon by the method ordinarily known as Volkmann's, which consists in removing the breast, the lymphatics, and fat from the axilla, and, in most instances, the fascia or superficial layers of the pectoralis major muscle.

The remaining cases of this series indicate the efficacy of the operation in a measure, but the ultimate result cannot be told, as sufficient time has not yet elapsed; 52 per cent. of them are now alive. The deaths which have occurred have been mostly from metastases. Although they do not furnish proofs of the permanent efficacy of the operation, they do

give a basis for studying the objections sometimes raised to the operation.

A Consideration of the Technique of the Operation.—The most pressing question concerning the technique of the operation now is, How widely shall the tissues be removed? About three years ago Halsted (*ANNALS OF SURGERY*, 1894, Vol. xx, p. 497) and Willy Meyer (*New York Medical Record*, December 15, 1894) almost simultaneously advocated extensive operations, which consisted in the removal of the breast and axillary contents, and a large part or all of one or both pectoral muscles in one mass. The removal of the lymph-nodes above the clavicle was also advised, but was not described as essential to either operation. These extensive operations have been done by many surgeons since that time, but few reports have been made concerning their efficacy. It removes muscles and fascia which are often cancerous, and gives such clear and easy access to the axilla as to permit the thorough removal of involved and suspicious lymphatics and fat. It should therefore be done, unless there are reasons for not doing it. The cases here recorded are sufficient to make a basis for studying the objections sometimes raised to the operation.

(1) The Mutilation of the Patient. This does not seem to be a valid objection. I have had the opportunity of tracing the history of twenty-six patients operated upon by this method, for periods varying from a few months to nearly three years. All had good use of the arm; they could raise it so as to dress the hair, could use it in ordinary household duties, and could put the hands behind the back. There is slight loss of power in adduction, which is, however, hardly noticed by the patient. Patients have been shown time and again in the meetings of the various medical societies who had good use of the arm after this operation. The one shown at the reading of this paper is an example. She is able to wash, iron, scrub, and do general house-work, two and a half years after her operation, although her pectoralis major, excepting a part of its clavicular portion, has been removed; by a dynamometer

the power of adduction with the hand in front and the elbow nearly straight is only one pound less upon the side of operation than upon the other side. The other muscles, particularly the coraco-brachialis and the anterior fibres of the deltoid, assume a function which was performed by the pectoral muscles, so that the patients, as a rule, do not suffer materially from loss of power.

(2) The second objection which has been raised is the œdema, which may be caused by the stripping of so long a portion of the axillary vein. This has been temporary in all those cases in whom it has existed at all.

(3) The third objection is the increased danger from the operation. If asepsis is preserved and hæmorrhage is quickly stopped, the radical operation is not more dangerous than the thoroughly performed Volkmann operation. The removal of the sternal portion of the pectoralis major or even the entire muscle is easier than the stripping off of its superficial layer, and retracting it so as to gain good access to the apex of the axilla. It is accompanied by less hæmorrhage and less bruising of the tissues and fewer "dead" spaces are left. In this series there was only one fatal case, and that was a woman of seventy-three, whose resisting power was so slight that she succumbed to an infection which probably would not have been important in a stronger patient.

Some surgeons advise the removal of the muscles in the far advanced cases, but leave them in the recent ones; but it is in the recent cases that a thorough operation is most important. If any cases are to be deprived of the advantage of a radical operation it should be the more advanced ones, for in many of them the growth has already advanced beyond the tissues which are accessible by operation. In the recent cases we have far more hope of really eradicating the disease. The size of the lump in the breast is no certain indication of the extent of the growth in the axilla. I have found very extensive axillary and cervical involvement where the mammary nodule was not larger than a walnut.

The clearing of the posterior cervical triangle is advised for all cases by some operators; others say that if the cervical lymphatics are involved the disease has already spread to the mediastinum or other inaccessible parts, and hence any but a palliative operation is useless. In this series of cases the cervical triangle has not been explored as a routine, and I have failed to see evidences that the patients would have been better had it been done. Still, the supraclavicular lymph-nodes are frequently cancerous, and if so they are a menace, and as their removal does not add very materially to the length or danger of the operation, one cannot well argue against it. It will, doubtless, be done more in the future than it has been in the past.

The extent of the skin incision is a question of great importance. The method for these patients has been to carry it about two inches from any place where the growth impinges upon the skin, irrespective of the possibility of uniting the skin edges afterwards. The upper part of the incision is carried to the insertion of the pectoralis major passing above rather than through the axilla. The skin is then widely laid back externally and below so as to expose the latissimus dorsi and the lower fibres of origin of the pectoralis major, and above and internally to the clavicle and sternum. The chief purpose of this is, of course, to permit the removal of the subcutaneous tissues, but it gives the additional advantage of permitting the skin to be approximated to a remarkable degree, so that usually there is no defect to be filled in by grafting or granulation. In approximating skin edges considerable tension may be used if the parts at a distance from the wound are thoroughly supported by the dressing. If there is a defect, skin-grafting at the time of the operation is generally the easiest way to cover it. If all preparations have been made, it only adds a few minutes to the duration of the operation. No recurrence has occurred in these patients, which apparently would have been obviated by a wider skin incision.

The axillary artery or vein has not been cut because

no patient would have been benefited by that procedure. In the only case in which they were involved in the growth it had also spread so far as to render any operation but a palliative one useless. The long subscapular nerve has not been cut, although parts of the vessels which accompany it have frequently been removed.

The cases of recurrence in or about the site of operation are the ones which should throw the most light upon the question of tissue removal. As the extent of these operations has increased, these recurrences have steadily become less frequent, until now we can confidently expect that they will come in very small number when the growth is not very extensive. The eight recurrences which have appeared among the twenty-three patients who have had the complete operation were with two exceptions in patients who had such extensive growths that only palliative operations could be done. In three (Cases XV, XVII, and XXV) of them the breasts contained large, ulcerating masses which involved the chest walls, and which naturally pressed forward from that location after the operation. Such cases should properly be considered under the head of palliative operations. All surgeons dislike to operate upon them, but do so because it often promotes comfort and prolongs life to a remarkable degree; one cannot, however, expect a cure when the chest wall is really involved in the growth. Two others (Cases XIII and XX) had such virulent types of the disease that operation, even of the most radical kind, availed nothing. The disease terminated fatally in each case ten months after its first appearance. In one the condition which has been described as mastitis carcinomatosa ("Diseases of the Breast," Williams, London, 1894, p. 318) existed. It looked more like phlegmon than cancer. The skin, subcutaneous tissue, and breast were infiltrated with nests of cancer-cells, and the rapid recurrence indicated that the surrounding tissues were similarly involved. The other acute case had only had symptoms for two months when admitted to the hospital. Nearly the entire breast was involved. A very

thorough Halsted operation was done. Four months later a secondary operation was necessary, and the axilla was found completely embedded in cancerous material. Such virulent cases as these are hopeless from the time when they are really started, and no deductions can be made from them in regard to the operative technique. Surrounding tissues quickly become so infiltrated with the disease that its removal is impossible. Fortunately, such cases are rare. The rapidity of growth is a most important element in the prognosis. A patient with a slowly growing cancer of considerable duration is more likely to be cured than one with a rapidly growing cancer of short duration. Case XXII had what Halsted calls a regional recurrence, six months after operation, consisting of multiple nodules scattered in the skin at a distance from the site of operation. The growth had existed a year at the time of operation, and infection must have already been carried to the skin by the lymphatics. It is doubtful whether any removal of the skin, which was practical, would have prevented this recurrence. The patient died with symptoms of metastasis in the lumbar spine three months later. The two remaining cases had local recurrences within the proper field of the operation. One noticed a freely movable filbert-sized nodule in the axilla twenty-two months after the operation. In the following year it grew to the size of a hickory-nut. The other developed a nodule in margin of the divided pectoral muscle. The first one indicates that even with careful dissection a bit of infective material which should be removed is sometimes left. The second recurrence would not have come if more of the pectoral muscle had been removed.

The small number of local recurrences indicates the advantage of very thorough and careful clearing of the field of operation. The eight cases who died of metastasis show how far the disease had advanced at the time of operation.

Taking the cases together, they argue for an early and thorough operation, and hold out the hope of cure in from one-third to one-half of the patients who are operated upon

within a reasonably early time, and the mitigation of suffering and prolongation of life to those who are not cured. A thorough clearing out of an extensive operative region means very few local recurrences, but deaths from metastasis cannot be prevented in those patients in whom the disease has already spread beyond the operative field.

The extent to which this radical operation is an improvement upon former ones can only be proved when many series of cases so operated upon are observed for years. This has not yet been done; but among those mentioned in the table of good results above, Rotter and Helferich have operated by methods almost like the radical one here considered, and the others have been very thorough in removing suspicious tissue, and have often removed much of the pectoral muscle. It is interesting to note the improved results obtained by the individual operators as they have removed more and more tissue.

The Immediate Effect of the Operation.—Besides knowing the ultimate prognosis, one will wish to know the discomforts of the operation. Patients are usually surprised, after an operation, to find that they hardly suffer any pain. On the second day the head of the bed and with it the shoulders of the patient are usually elevated. On the third day solid and semisolid food are given, and the arm is loosened in its sling. The patient is usually out of bed a part of the time by the sixth or seventh day. Generally they leave the hospital some time in the third week. The average time of stay in the hospital for these patients has been twenty-two and three-sevenths days. The shortest time nine days. Twenty-one of the cases have healed by first intention; a large percentage, considering that nine of the patients had ulcers in the breast at the time of operation. Those who did not heal throughout by primary union had only slight granulation, usually situated where the skin did not cover the underlying tissue, or in one instance a slight undermining of the tissues at the margin of the wound.

The temperature has ordinarily been 100° to 101° F.

on the second or third day. The comfort of the first part of the time after operation and the rapid healing of the wounds have been promoted by the method of dressing. The skin flaps have been supported and held in close apposition to the chest wall by strips of rubber adhesive plaster, which have been firmly applied outside of the sterilized gauze which was laid immediately over the incision. Cotton outside of this was held firmly in place by a binder, which is similar to those used in obstetric practice, excepting that it has a sleeve. This is held firmly in position by safety-pins. It brings firm pressure on the wound where it is needed, and adds greatly to the comfort of the patient. It is easily applied and easily readjusted if too tight, or removed and repinned when dressing is necessary. The arm is supported in a sling which is pinned to this bandage. See illustration.



Dowd's binder for holding the dressing in position after operation for cancer of the breast.

HISTORIES OF CASES.

CASE I.—Mrs. T., aged forty-one years. Lump in right breast for four months, now the size of an English walnut, in upper outer quadrant of breast. No attachment to skin or fascia; no evident axillary involvement. Operation March 13, 1893 (Volkmann's). Healing by primary union. Highest temperature 101° F. Left hospital April 4, was delayed owing to an accidental burn at thigh. Pathological report: "Carcinoma, be-

ginning invasion of fat." Seen October 27, 1897. Has been in good health, and busily occupied during the four years and seven months which have elapsed since the operation. Normal use of arm.

CASE II.—Miss Q., aged sixty-two years. Lump in left breast for six months, now size of hen's egg, on upper outer quadrant. No attachment to skin or fascia; no evident axillary involvement. Volkmann's operation, June 23, 1893. Healing by primary union. Left hospital seventeen days after operation. Pathological report: Scirrhus. October 22, 1897: Has been seen frequently since operation. Says she can do more work now than ever before. Does her own house-work. Normal use of arm.

CASE III.—Mrs. P., aged thirty-nine years. Tumor in breast for four months; now size of walnut; upper outer quadrant. Axillary lymph-nodes enlarged. Volkmann's operation, August 14, 1894. Healing by primary union. Left hospital in nine days. Pathological report: Axillary lymph-node carcinomatous. The specimen from the breast which was examined adeno-fibromatous. About February 1, 1895, two or three small lymph-nodes were removed from axilla in another city. October 25, 1897: Patient in good health; normal use of arm. Has worked steadily and hard since operation.

CASE IV.—Mrs. S., aged thirty-four years. For eight months the growth has been progressing in upper outer part of right breast. Now the size of a half orange; not attached to skin or fascia; axilla involved. Volkmann's operation, September 1, 1894. Healing by primary union. Highest temperature 100° F. Left hospital in eleven days. Pathological report: Carcinoma involving glands. Patient progressed well until winter of 1896, when she began to fail, and died July, 1896. Had symptoms of intrathoracic cancer; sternal bulging; neuritis on right side of back. No local recurrence.

CASE V.—Mrs. N., aged thirty-seven years. Rapidly growing tumor in breast seven months; now nearly the entire breast involved. Attached to skin and fascia; axilla involved. Volkmann's operation, September 21, 1894. Skin graft. Healing by primary union and granulation. Left hospital in seventeen days. Highest temperature 100.8° F. Pathological report: Carcinoma; evidence of invasion of fat. Seen November 1: Had

a cough and sternal bulging. December 1: Died with symptoms of pulmonary growth.

CASE VI.—Mrs. D., aged forty years. Slowly growing lump in right breast for one and a half years; now the size of small orange; ulcerating and adherent to underlying structures; axilla involved. Volkmann's operation, November 16, 1894. Skin grafting. Healed by primary union, excepting slight granulation at margins of skin graft. Highest temperature 100.6° F. Left hospital in seventeen days. Pathological report: Carcinoma. Seen November, 1897: Has been seen from time to time since operation; had œdema of arm at first, which has disappeared; has very good use of arm; has done house-work regularly; has now a slight spot of induration at inner end of cicatrix.

CASE VII.—Mrs. E., aged forty years. Lump in upper outer part of breast for six months; now size of orange and adherent to skin and fascia. Halsted's operation, December 3, 1894. Healing by primary union. Highest temperature 100.6° F. In hospital thirty-eight days after operation. Delay caused by swelling of arm, which subsided. Pathological report: Carcinoma of breast and axillary glands. August 23, 1895, small recurrent nodule removed from split edge of pectoralis major. Died January, 1896, with symptoms of spinal metastasis. No further local recurrence.

CASE VIII.—Mrs. T., aged fifty years. A nodule has existed in lower outer part of left breast for thirty years. Patient has noticed rapid growth during last month. Now size of hen's egg, ulcerating; attached to skin and pectoral fascia; axilla involved. Halsted's operation, January 30, 1895. Skin graft. Healing by primary union. Left hospital in eighteen days. Highest temperature 100.4° F. Pathological report: Breast carcinoma. The axillary gland, which was examined, was not carcinomatous. November 29, 1896: Patient has worked hard since operation, and earns good wages as cook; has normal use of arm. Is perfectly well so far as she knows, but there is a freely movable, subcutaneous, axillary nodule size of bean. She refuses to have it removed. November 4, 1897: Has been well during past year. Went to Germany in the summer, and is now working as cook. Axillary nodule still present; has grown slightly.

CASE IX.—Mrs. M., aged fifty-six years. Nodule in right

breast for twelve years. Patient has noticed rapid growth two months. Now almost entire breast involved. Growth adherent to skin and pectoral fascia. Axilla much involved. Operation February 7, 1895. Volkmann's (only palliative operation deemed advisable on account of extensive growth). Skin graft. Healed by primary union. Highest temperature 100.6° F. Left hospital in fifteen days. Pathological report: Scirrhus carcinoma. Died October 28, 1895, from metastases in lungs and liver. No local recurrence. Had good use of arm.

CASE X.—Mrs. S., aged thirty-five years. Has had a lump in outer lower part of left breast for three years. It is now as large as a goose-egg and is ulcerating; axilla much involved. Halsted's operation, March 26, 1895. Large skin graft. Healing delayed by undermining of flap beside the graft. Highest temperature 102° F. Left hospital thirty-five days after operation. Pathological report: Tumor, first specimen adeno-fibroma with only traces of malignancy; second specimen shows more clearly carcinomatous nature. Axillary lymph-node; typical carcinoma. Died August 11, 1895, with symptoms of tumor in cervical spinal cord. No local recurrence. Had regained normal use of arm.

CASE XI.—Mrs. C., aged sixty-seven years. Growth in left breast for one and a half years. Now five inches in diameter. Attached to skin and pectoral fascia. Axilla much involved. Halsted's operation, April 8, 1895. Healing by primary union. Highest temperature 101.8° F. Left hospital in fourteen days. Pathological report: Breast, tumor, and gland carcinomatous. May 29, 1895: In good health; good use of arm; can put hand behind waist and above head. Died about December 1, 1895, with symptoms of spinal involvement. Site of operation in good condition.

CASE XII.—Mrs. C., aged fifty-one years. Itching about nipple for one year, with ulceration. Tumor in breast five weeks. Now tumor beneath nipple two inches in diameter; nipple almost gone; slight ulcer there. Halsted's operation, April 13, 1895. Healing by primary union. Highest temperature 100.8° F. Patient left hospital in nine days and resumed her work. Pathological report: Adenoma with evidence of commencing carcinoma. May 8, 1895: Patient in good health; good use of arm;

can put hand above head and behind waist. October 23, 1897: Patient has continued in good health.

CASE XIII.—Miss N., aged forty-two years. For two months has noticed a rapidly growing lump in right breast. Now, a hard growth three and a half by four inches in size occupies the upper part of the breast. It is adherent to the skin. The axilla is much involved. Halsted's operation, May 3, 1895. Healing by primary union. Highest temperature 100.3° F. Left hospital in eleven days, in good condition. Pathological report: The tumor is irregular in shape and infiltrates the surrounding tissues. Its centre is degenerated and broken down. Microscopically it is carcinoma, the lymph-nodes being extensively involved. July 8, 1895: Patient in good health and has good use of arm. September 20: Secondary operation for a recurrence which involved the axilla with a solid mass of cancerous material. January 12, 1896: Died.

CASE XIV.—Mrs. L., aged forty-five years. Noticed a lump in right breast seven months ago. It was partially excised five months ago, now breast hard and indurated. Axillary lymph-nodes enlarged. Halsted's operation, May 16, 1895. Wound healed well excepting for a sinus which led to a small piece of necrotic tissue just below the clavicle. Highest temperature 101.2° F. Patient in hospital thirty-three days after the operation. Pathological report: Breast and glands. The glands alone appear to be involved and are much enlarged. Microscopically they show carcinoma with areas of coagulation necrosis. In January, 1896, an exploratory incision was made on account of a suspicious hardening in the axilla, which, however, proved to be cicatricial and not cancerous. November 8, 1897: Patient in very good health; does her own house-work, and uses right arm in washing, ironing, and scrubbing.

CASE XV.—Mrs. G., aged sixty-five years. Has had tumor in breast for one year. It has grown steadily and is now badly ulcerated, and attached to deeper structures. Axilla much involved, and between breast and axilla there is a subcutaneous nodule the size of a horse-chestnut. May 25, 1895: Palliative Volkmann's operation done. Considerable surface left to granulate. Patient left hospital in thirty-four days. Highest temperature 101.2° F. Pathological report: Carcinoma of the scirrhus

variety. Patient lived a little more than a year after the operation. Had extensive recurrence on chest wall.

CASE XVI.—Miss B., aged thirty-six years. Lump in breast for two months. Now it is two and a half inches in diameter; not adherent to skin or pectoral fascia. The axillary lymph-nodes are enlarged. Halsted's operation, July 5, 1895. Healed by primary union. Highest temperature 100.4° F. Left hospital in twenty-one days. Pathological report: Carcinoma. In November, 1895, the other breast was removed for nodules which proved to be fibromata. October 23, 1897: Patient has had no sign of recurrence, is in good health, and does a "fair day's work," but has felt the depressing effect of her illness nervously.

CASE XVII.—Mrs. N., aged sixty-two years. Rapidly growing tumor in breast for one year. Now entire breast involved; large ulcerating places; firm attachment to pectoral fascia; axilla and lymph-nodes much enlarged. Halsted's operation, October 21, 1895. Healed by granulation. Highest temperature 100.4° F. Left hospital in thirty-one days. Patient died August 30, 1896, with extensive recurrence on chest wall.

CASE XVIII.—Mrs. X., aged forty-seven years. Lump in inner lower border of right breast for one year. Now two and a half by three and a half inches; skin adherent; axilla involved. Halsted's operation, January 27, 1896. Healed by primary union. Highest temperature 101.2° F. Left hospital in twenty-one days. November 1, 1897: Has been seen occasionally since operation. Has normal use of arm, and has better health than she has had for years. No recurrence.

CASE XIX.—Mrs. D., aged seventy-four years. Tumor in upper outer part of right breast for three months. Now size of hen's egg; not adherent to skin or pectoral fascia. Halsted's operation, May 11, 1896. At the time of the operation the tissues were found to be very flabby and soft. Pathological report: Carcinoma. Patient died two days later. The wound looked well, but streptococci were found in cultures from it and from the blood. It is believed that owing to her advanced age and poor resisting power she yielded to a degree of infection which would not have been serious in a younger person.

CASE XX.—Mrs. T., aged forty-five years. Five months' induration of left breast, which has grown very rapidly in last month; arm swollen two weeks. Now entire breast enlarged to

twice the size of the other. Skin over it inflamed. Antiphlogistic treatment was unavailing, and Halsted's operation was done June 25, 1896. Extensive skin graft. Healing by primary union, with slight granulation about the edges of the skin graft. Highest temperature 101.6° F. Left hospital in thirty-one days. Pathological report: Carcinoma with infection of axillary glands. Gram's stain showed no micro-organisms in the tissues. Patient died November 10, 1896, with extensive recurrence on chest wall.

CASE XXI.—Mrs. T., aged thirty-seven years. Lump in inner lower part of left breast for one and a half years. Now size of small orange, adherent to skin. Axilla involved. Halsted's operation, May 14, 1896. Skin graft. Healing by primary union. Highest temperature 100.4° F. Left hospital in eleven days. Pathological report: Carcinoma of breast and axillary lymph-nodes. Died October 18, 1897, with symptoms of spinal metastasis, which apparently started in lumbar vertebræ about a year earlier.

CASE XXII.—Mrs. O., aged fifty-five years. For one year tumor in outer lower part of left breast. Now size of goose-egg, adherent to skin. Nipple retracted. There has been a slight discharge from it for six weeks. Axilla much involved. Halsted's operation, June 15, 1896. Skin graft. Healed mostly by primary union with granulation in part of the skin grafted area. Highest temperature 100.2° F. Left hospital in forty-one days. Pathological report: Breast and lymph-nodes carcinomatous. December 9: Patient has small nodules scattered about the skin several inches from the incision. The skin is removed and the defect skin grafted. March, 1897: Died with spinal metastasis in lumbar region.

CASE XXIII.—Mrs. D., aged sixty-two years. Lump in upper inner part of right breast for six months. Now size of hen's egg. Halsted operation, September 28, 1896. Slight superficial suppuration. Left hospital in twenty-two days. Pathological report: Cystic structure, cysts containing gelatinous substance, within which are the remains of gland acini. In parts of sections there are masses of cells having malignant appearance. October 26, 1897: No recurrence. Patient in fair health.

CASE XXIV.—Mrs. H., aged fifty-four years. Lump in centre of breast for five months. Now size of hen's egg; not

adherent to skin or pectoral fascia. Axilla involved. Halsted's operation, February 15, 1897. Pectoralis minor also removed. Skin graft. Healing by primary union. Left hospital in seventeen days. Pathological report: Carcinoma. October 15, 1897: Working regularly; good use of arm. No recurrence.

CASE XXV.—Miss J., aged sixty years. Lump has been growing in left breast for one year and eight months. Now two-thirds of breast and axilla involved; ulceration present; growth attached to pectoral fascia. Halsted's operation, April 29, 1897. Pectoralis minor also removed. Healing by primary union, excepting where uncovered area granulated. Highest temperature 100.2° F. Left hospital in thirty-six days. Good use of arm. Pathological report: Carcinoma. November, 1897: Recurrent nodule in scar.

CASE XXVI.—Mrs. X., aged sixty-six years. For six months lump in middle of left breast, now size of hen's egg; adherent to skin. Axilla involved. Halsted's operation, June 28, 1897. Pectoralis minor removed. Healing by primary union. Left hospital in twenty-one days. Pathological report: Tumor, fibro-carcinoma; much fibrous tissue. Axillary lymph-node shows rapid infiltration. October 27, 1897: Patient in good health and working regularly. Good use of arm.

CASE XXVII.—Miss N., aged fifty-five years. Lump in outer upper part of right breast for four months. Now size of small orange; adherent to skin. Axilla involved. Halsted's operation, October 7, 1897. Pectoralis minor removed. Healed by primary union. Highest temperature 101° F. Left hospital in twenty-three days. Pathological report: Medullary carcinoma; vessels scanty. Tumor shows rapid degeneration at periphery. November 6: Good use of arm; can dress her own hair and pin her own skirt behind the waist.

CASE XXVIII.—Mrs. H., aged forty-two years. Has noticed a lump in breast for seven weeks. It is now as large as a hickory-nut, and attached to the skin. Palpable lymph-nodes in axilla and supraclavicular region. Halsted's operation, October 18, 1897. Pectoralis minor also removed. Supraclavicular lymph-nodes removed. Healed by primary union. Highest temperature 101.2° F. Left hospital in nineteen days. Pathological report: Carcinoma; axillary and supraclavicular lymph-nodes also carcinomatous

CASE XXIX.—Mrs. E., aged fifty-nine years. Lump in middle of left breast for two years. Now size of small orange; adherent to skin and deep structures. Axilla involved. Meyer's operation, November 1, 1897. Healing by primary union, excepting where a part of the skin margin sloughed and retracted. Highest temperature 101° F. Left hospital in thirty-four days. Pathological report: Carcinoma.

REMARKS UPON THE DIFFERENTIAL DIAGNOSIS, THE PATHOLOGY, AND THE TREATMENT OF APPENDICITIS.¹

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IN former writings upon this subject, I have stated that the diagnosis of appendicitis is, in the majority of instances, an easy one to make. While this is true, it will nevertheless be understood that there are exceptional cases in this, as in all other surgical affections, when the diagnosis can only be made after a careful sifting of the symptoms and a conclusion reached by the process of exclusion. A wider range of experience increases the number of anomalous conditions which an inflamed appendix may present. Such anomalous conditions, as, for example, when an inflamed appendix with abscess-formation points upward, backward, and outward, lying in contact with the external layer of the ascending mesocolon and in front of the outer border of the kidney, might readily be mistaken for a perinephritic abscess or an abscess of the kidney itself. Under these circumstances an incision through the loin, such as is made for the evacuation of perinephritic collections, does not disprove that the purulent matter thus withdrawn was not of appendical origin. A case in point has recently come under my observation.

The original diagnosis was appendicitis, and an incision, for the evacuation of the collection on account of the desperate condition of the patient, was made through the loin. Recovery with

¹ Read before the Tri-State Medical Association, at Cumberland, Md., December 16, 1897.

repair of the wound followed. The patient, however, was unable to resume his occupation on account of localized pain referred to and above the posterior half of the crest of the ileum. Six weeks after recovery from the operation for the evacuation of the abscess he was again referred to me. Upon examination the incision was found intact, but tender. Upon palpation of the painful point distinct resistance was made out. Removal of the appendix was recommended. When under the anæsthetic, and while being placed upon the operating-table, a distinct fæcal odor was noticed which was thought to be due to a bowel movement. Upon the removal of the antiseptic dressing covering the proposed field of operation, it was noticed that the cicatrix had broken down at one point and that fæcal matter was escaping from it. Believing this to be a fæcal fistula, the result of an original attack of appendicitis, I opened the abdomen, isolated the field of operation by gauze packing, and located the appendix, which was found in direct communication and continuous with the fæcal fistula. The appendix was removed, and the wound disposed of after the manner of such-cases. While preparing this paper I have met with a parallel case.

The affections which simulate acute appendicitis and are more difficult to differentiate include movable kidney, diseases of the gall-bladder and bile-passages, nephritic colic, perforating ulcer of the gastro-intestinal tract, extrauterine pregnancy, suppurating ovarian cyst, and ovarian cyst with twisted pedicle.

Movable Kidney.—In arriving at a correct diagnosis between movable kidney and appendicitis, first of importance to be borne in mind is the fact that movable kidney is most commonly seen in neurasthenic women with gastro-intestinal disturbance. The attacks of pain in movable kidney are associated with nausea and vomiting, fever, and often chills. In the majority of instances the urinary function is disturbed, as instanced by the frequent desire to urinate, the act of which may be painful and the urine large in amount, particularly if the patient is of a nervous disposition. The urine may contain blood, and, as I have seen in some attacks, pus, but the high color of the urine is more likely to be due to

the presence of an excess of uric acid or oxalates. The differentiation between the local disturbance in movable kidney during an attack and appendicitis is, to say the least, highly important. The fact must not be lost sight of that in these cases it requires careful study to reach a definite conclusion. The points to be gone over in the attempt to reach a correct conclusion are to be elicited by careful questioning of the patient and the results of examination. By the history can be learned the frequency of the attacks of pain, its nature, the point of the abdomen to which pain is referred; whether it is confined to one point or shifts; whether or not it occurred after the ingestion of a heavy meal, exposure to cold, or during the period of digestion; or after unusual movement or position or indirect violence. The degree of illness following must be found out as well as the tendency of the patient to constipation or diarrhoea. During or following an acute exacerbation of pain due to movable kidney occurring in either a nervous or robust individual; local examination will show pronounced rigidity of the overlying abdominal walls, with tenderness, the degree of which is in direct proportion to the muscular rigidity.

The important differential points between appendicitis and movable kidney are these: In appendicitis we have the sudden onset of acute abdominal pain most commonly following the partaking of indigestible foods, and which, at first, is referred to the epigastrium or to the region of the umbilicus, later becomes localized in the right iliac fossa. The presence of fever and an increased pulse-rate speak more for appendicitis. Then, in appendicitis, the rigidity of the lower portion of the right rectus muscle and the flat muscles of the abdominal walls immediately overlying the inflamed organ differs from the rigidity present in movable kidney, in that it does not involve so much area. The presence of a most acute tender point, corresponding to the inflamed appendix, is, at least early in the inflammation, more circumscribed than the tenderness in movable kidney. Against this, in the case of movable kidney, the area of ten-

derness is not so painful to slight pressure; it extends over a greater space; and the pain being, as a rule, not so intense is at once referred to the site of the kidney. Movable kidney attended by both pain and rigidity requires very delicate manipulation to detect it. By having the patient breathe with the mouth open, and with the thighs flexed slightly upon the abdomen, gentle pressure enables us to detect the kidney slipping away from the examining finger. I see cases, however, where nothing short of anæsthesia will clear up the question of a movable kidney. I might add that the presence of nausea extending over days is one of the most prominent symptoms in certain cases of movable kidney.

The operator may be thrown off his guard by acute indigestion occurring in a nervous individual suffering at the same time from acute paroxysms of pain due to a movable kidney which was previously not known to the patient or to the physician. Under these circumstances the kidney may become temporarily anchored in its abnormal position. Under the foregoing conditions I have been called to operate for acute appendicitis when I could not say definitely that the case was not acute appendicitis until the patient was fully anæsthetized, when upon palpation the diagnosis at once became clear. Again, in the presence of both the conditions—*i.e.*, movable kidney with acute symptoms and an enlarged appendix due to chronic inflammation—examination under ether will disclose not only the abnormal condition of the kidney but also the presence of a palpably enlarged appendix. If under these circumstances the patient has been suitably prepared, an appendical operation should be gone on with. The operator, whose experience in appendical work has been rich, can usually say, upon what to the by-stander seems to be a superficial examination of the belly walls, whether the case is one of movable kidney or appendicitis. On the same principle, in the presence of a peritonitis the result of appendicitis, the every-day operator can often separate the operative from the non-operative cases by palpation of the belly walls alone.

The diseases of the bile-passages which may simulate appendicitis are: first, infectious catarrhal inflammation of the bile-ducts, due most commonly to the presence of gall-stones in the common duct; and, second, ulceration of the ducts, due to the same cause. Careful study of the history of this class of cases will usually reveal a period of invalidism not necessarily continuous and accompanied by symptoms of intermittent fever. However, it is only during the acute stage of a recurrent attack, when the patient is the subject of severe pain, that this affection is most likely to be confounded with appendicitis.

The diagnosis between biliary colic and appendicitis is at times difficult.

The onset of both is somewhat similar,—namely, sudden development of acute pain, accompanied by persistent vomiting, which last is more severe and prolonged in biliary colic than in appendicitis. The history of the case will generally show differences sufficiently marked to distinguish the two diseases.

Less severe attacks of biliary colic will probably have occurred at intervals of several years; they are accompanied by jaundice, which later almost invariably becomes pronounced; while the characteristic color and itchiness of the skin may persist in a slight degree during the entire interval between the attacks.

Biliary colic is frequently ushered in by a chill. Fever is absent, particularly in the early stages of the disease. The bowels, as in appendicitis, are usually constipated; when moved, however, the stools have a dark-green color and a peculiar, mouldy odor. If gall-stones are found, as is frequently the case, the diagnosis is established.

The location and degree of pain differ from that of appendicitis, being in biliary colic more continuous and severe, and radiating usually from the lower right chest margin to the umbilicus.

While in later stages pain may become constant, and involve the whole epigastric region, or extend even lower,

nevertheless, it will at intervals of two or three days become localized and more acute in the region of the gall-bladder, —*i.e.*, about the ninth costal cartilage.

In appendicitis the localization of pain is usually towards, if not directly in, the right iliac fossa; the exception being when the appendix holds an anomalous position, while between severe paroxysms there is marked tenderness at this part, and characteristic rigidity of the overlying abdominal wall.

A patient the subject of simple empyema of the gall-bladder presents evidences of general constitutional disturbance, though these are usually slight. The temperature may or may not be increased; in some instances the rise in temperature is marked from the onset of the disease, and when associated with chill is indicative of pus-formation. The pain in empyema of the gall-bladder is ordinarily acute, and will necessitate the recumbent position in order to avoid movements which increase the pain.

The patient, especially if the temperature is high, rapidly emaciates and becomes weak, owing to the loss of appetite. Jaundice is not always associated with empyema of the gall-bladder, and is only present when there is a catarrhal condition in the bile-ducts, or an impacted stone in the common duct.

On account of the localized peritonitis tenderness is an almost invariable symptom. The points to be considered in making a differential diagnosis are the history, the onset, the location and the character of the pain, the area and degree of muscular rigidity, and the character and position of the tenderness.

One of the most important points in the differential diagnosis between empyema of the gall-bladder and appendicitis is that, if the patient is seen early in the affection before adhesive inflammation occurs, the distended gall-bladder will be found to move with respiration and noted as a fluctuating rounded swelling, particularly when the patient is examined in the upright position.

If the gall-bladder ruptures, the pus takes one of several directions, escaping externally; ulcerating through the abdominal wall directly over the tumor; following the course of the suspensory ligament of the liver, and evacuating itself through the navel, or, as has not infrequently happened, rupturing externally in the right iliac region over the cæcum or pubes. The contents of an empyema of the gall-bladder may be evacuated spontaneously into the duodenum or transverse colon; into pelvis of the ureter; into the stomach; or into the inferior vena cava or portal vein.

The differentiation between rupture of an empyema of the gall-bladder with or without involvement of the ducts and of a ruptured appendical abscess is extremely difficult, and in most cases the condition will only be revealed by operation. The main points to be noted are the previous history and the high position of rigidity of the right rectus muscle occurring in the case of ruptured gall-bladder.

Acute Phlegmonous Cholecystitis and Gangrene of Gall-Bladder.—The differential diagnosis between these affections and acute appendicitis may be extremely difficult, particularly when the former affections are not associated with or due to gall-stones. There may be vomiting in both, although in appendicitis it is not so persistent. In acute phlegmonous cholecystitis or gangrene of the gall-bladder the symptoms follow in rapid succession. The pain is acute, located high up on right side, with a tendency to radiate towards right scapular region, and later rapidly becoming general. The pulse is quick and of small volume; there is elevation of temperature, though this is not of much diagnostic value; rapid and shallow respiration, thoracic in character; and great depression amounting almost to shock. The peritonitis, localized at first, soon becomes general, unless adhesions have not formed to limit the escaping contents of the gall-bladder. Jaundice is not always present.

In acute phlegmonous inflammation of the gall-bladder a fatal termination most frequently follows shortly after the onset. In the subacute varieties an abscess may be localized

around the gall-bladder with adhesive peritonitis, thus simulating an appendical abscess.

It must be recollected that in appendicitis the point of greatest tenderness is usually located at a point along the outer border of the right rectus muscle, which bisects a line drawn from the anterior superior spine of the ilium to the umbilicus; while in acute phlegmonous cholecystitis, and in gall-bladder inflammation in general, the point of greatest tenderness is most frequently at the junction of the upper two-thirds, with the lower third of a line drawn from the ninth rib to the umbilicus.

Nephritic Colic.—Ordinarily, it should not be difficult to differentiate between nephritic colic and appendicitis, but misleading conclusions may be reached, owing to the fact that in exceptional cases of appendicitis there exist simultaneously pain, referred to the pubic region; retraction of the testicle associated with vesical tenesmus; and painful and frequent micturition. Error, however, can only occur in the early stages of appendicitis, as the symptoms later on are entirely dissimilar.

Renal colic is usually ushered in by a distinct chill, followed by excruciating pain in the loin posteriorly, which is often relieved by pressure. This pain radiates along the course of the ureter, and is much diminished by the voiding of urine, which often amounts to large quantities. In appendicitis, the pain at the onset is more diffused, is increased by pressure, and is in no way affected by micturition. In renal colic there is no rigidity of the abdominal wall, no tender mass in the right iliac fossa can be palpated, and urine examination shows characteristic alterations,—*e.g.*, uric acid or phosphatic deposits, blood, pus, etc.

Gastro-Intestinal Ulcers.—The points to be observed in a differential diagnosis between appendicitis and perforated ulcers of the gastro-intestinal tract, including gastric, duodenal, cæcal and colic, and perforating typhoid ulcer, are the following:

The greatest liability to perforation in gastric ulcer, according to Barling, is in young women between the ages of

seventeen and twenty-five years. There is also a certain liability, though not so great, in males; while in the adults it occurs chiefly between the ages of forty and fifty.

As a rule, a patient with perforated gastric ulcer will have suffered for some time previously from symptoms referable to the stomach. This, however, is not always true, as perforation has occurred in cases where there has never been a history of indigestion. Perforation of the stomach nearly always occurs in the presence of a full or partly filled stomach, with the patient in the vertical position. Further, a history of exertion in rapidly changing the position of the body; or coughing or sneezing can be elicited. The perforation is usually attended by sudden acute pain in the epigastric region, followed by faintness or collapse. The pain is of a burning or scalding character and referred to the extreme upper abdomen. Recovery from the depression consequent upon the onset of pain may be followed by bloody vomiting, although this is not universally true. Coincident with the above symptoms there is pronounced rigidity with a scaphoid belly.

Respiration and temperature are both influenced by the condition, the former being hurried and superficial and the latter subnormal. The pulse is rapid and small. The length of time intervening between the occurrence of perforation and a fatal termination will be determined by the size and position of the perforation. The escaped contents of the stomach may be confined between the stomach and diaphragm, stomach and liver, and the stomach and transverse mesocolon. In such conditions the following peritonitis will be localized and confined to the upper abdomen. These are the more favorable positions for the escape of the stomach contents. In any of these situations a localized abscess may result. When the perforation communicates directly with the general peritoneal cavity, diffuse peritonitis rapidly supervenes, which, at first associated with general muscular rigidity, is soon followed by tympanites and the usual signs of this affection. I submit reports of a few cases.

G. R., female, aged twenty-five years, was admitted to the German Hospital on January 19, 1897. She had been taken suddenly ill two days before, having complained previously of dyspepsia and pain in stomach, but had never noticed any bloody vomiting. She was moribund at time of admission, and died twenty-four hours later with all the signs and symptoms of acute general peritonitis.

Autopsy.—The stomach presented a perforation about the size of a ten cent piece (the greater curvature) near the pylorus.

A. J., female, aged twenty-nine years. Chronic gastritis. Ulcer of stomach. Admitted January 4, 1897. Perforative peritonitis with abscess. It was difficult to get history, as she could not speak English. She sought aid on account of pain and distress in stomach after eating.

Family History.—Parents well. Two brothers and five sisters healthy. One sister suffering from effects of twin pregnancy. Two brothers and two sisters died in infancy.

Previous History.—Lived in Finland until one year ago last August, when she came to this country. Worked very hard on a farm while in Finland. Greatly exposed. Had plain and good food. No alcoholic stimulants. Health as a child was good, but has been troubled with dyspepsia for the last fourteen years. Was in a hospital in Sweden five years ago for present trouble. Menstruation established at fourteen years of age, and has had leucorrhœa. Complained fourteen years ago of distress in abdomen after eating. Condition gradually increasing in intensity. Frontal headache and flushes would accompany attacks with occasional vomiting and nausea. Attacks would come at frequent intervals, especially after eating sour articles. Always constipated. On coming to this country was in fair health. Weight then 175 pounds. Has been working hard up to time of admission.

Present Condition of Patient.—Temperature normal. Complexion sallow with pink cheeks. Lips pale. Pupils equal and slightly dilated. Conjunctiva pearly. Fairly well nourished, but has lost fifty pounds in weight. Present weight 129 pounds; sweats freely and frequently; no glandular enlargement; persistent tenderness over epigastric region; some vomiting, especially on taking solid food; no blood in vomited matter. Palpitation of heart on exertion.

Physical Examination.—Chest well formed. Respiratory murmur clear. Heart normal. Liver and spleen normal. Stomach contents acid in reaction. No free hydrochloric acid.

March 15, 1897.—Blood found in stomach contents (about fifteen cubic centimetres).

March 16.—Blood again noticed in stomach contents.

April 5.—Area of dulness from ninth to twelfth rib in post-axillary line on left side extending forward to anterior axillary line. Great tenderness over this area. Patient weak. Diagnosis of post-gastric abscess (subdiaphragmatic) which was believed to be the result of slow leakage from perforated gastric ulcer.

April 7.—General peritonitis. Operation considered unwarrantable.

Autopsy report was as follows: Body of an extremely emaciated adult woman; with no external points of interest.

Thorax: On opening body thoracic organs were found normally related. Pericardium carried a normal amount of fat, sac walls being of average thickness and containing a tablespoonful (fifteen cubic centimetres) of straw colored fluid. Heart soft and pale, weighing 270 drachms. A currant jelly-clot was found in left ventricular cavity with apparently healthy and sufficient valves. Lungs: Left, free in cavity, light in color and crepitant. Right, adherent throughout its lateral and posterior aspects. Apex normal and base dark. Apex crepitant, base consolidated; pressure upon cut surface forces out bloody serum from bronchioles. *Abdomen:* Walls of moderate thickness. Omental apron present carrying considerable fat and covering the entire intestinal coils. Coils of small bowel in many places adherent to each other, with areas of deep congestion. Appendix normal in size, very pale, and slightly indurated at tip. Colon pale, otherwise normal. *Stomach:* Pyloric orifice decidedly thickened at a point on the greater curvature two inches above orifice. There was an adhesion between the anterior surface of the stomach and the gastro-colic omentum, which fold continued adherent throughout the entire greater curvature and was drawn up over the anterior surface of stomach and anchored fast by adhesions to the diaphragm and the anterior superior border of the left lobe of the liver. This with the gastro-splenic fold, adherent as it was to the foregoing reflections and the fundus of the organ, formed a

new anterior gastric wall, which, when opened, showed ordinary stomach contents, and, at its inferior ventral border, an opening in the stomach wall proper about the size of a quarter dollar. On either side three-fourths of an inch distant was an ulcerated area about the size of a silver dollar, with the mucous membrane perforated, deeply congested and hypertrophied, presenting conditions simulating malignant involvement. The other organs presented nothing abnormal.

In perforated duodenal ulcer the general symptoms are similar to those occasioned by perforated gastric ulcer. The most important point in the differential diagnosis between the two conditions is the appearance in an individual apparently in perfect health of a recurrent intestinal hæmorrhage followed by anæmia. There may be hæmorrhage from the stomach coincident with or accompanying a discharge of blood from the bowel. The pain in duodenal ulcer occurs an hour or more after the ingestion of food, while in gastric ulcer it immediately follows. Frequent attacks of hæmatemesis associated with neuralgia of the epigastrium and bloody stools may be considered as pathognomonic of duodenal ulcer.

The question as to the existence of perforating ulcer of the ascending colon may arise in the differential diagnosis between appendicitis and the previous conditions. Ulceration of the colon is most likely to be associated with malignant disease, in which event there are present such symptoms as attacks of paroxysmal pain followed by small bowel movements, containing more or less mucus, which may be mixed with blood; the presence of a mass; the history of slow onset; cachexia; while, when obstruction exists, the distended coils of intestine may be made out during a paroxysm of pain by examination of the abdominal walls.

Mrs. R., aged sixty years, was admitted to the German Hospital June 21, 1897. Carcinoma of the cæcum. Ileo-colostomy. Father died of kidney trouble; mother in childbed; five brothers and two sisters alive. Married for forty years. Eight children.

Menstruation regular after marriage. Menopause ten years ago. Has had bladder trouble for some time. Stone removed from bladder four years ago.

In December, 1896, had first attack of her trouble. Severe lancinating pain in the right iliac fossa, recurring at short intervals; since then she has scarcely passed a day without pain, sometimes having severe exacerbations. She has frequent micturition, without tenesmus, and some ardor urinæ. Says a small growth was removed from urethra in May, 1897. No hæmaturia. Has passed gravel at times, but not lately. A good deal of sacral ache. Appetite good. Bowels regular. Tongue pale; not coated. Has not lost flesh, but no marked cachexia.

Examination.—Extreme tenderness in right iliac fossa. Right rectus very rigid, simulating a mass. Tenderness also on deep pressure in right vaginal vault. Uterus small and atrophied. No discharge. Catheterized. No blood or mucus in the bladder. No stone. Urethra has evidently been dilated.

Operation.—Incision over region of the appendix. A coil of ileum was found to be adherent to the cæcum. A hard mass being felt about the site of the appendix, the appendix was exposed and found to be completely separated from its cæcal attachment. By its removal with the exudate, a large hole was formed in the ileum, just before its junction with the cæcum. The lower end of the cæcum was involved in a carcinomatous growth. This was removed by careful dissection, cut away with the cæcum, and the bowel closed with continuous silk suture. The terminal four inches of the ileum were next removed, as its mesentery was infiltrated. Ileum closed with silk suture. Ileum anastomosed with transverse colon by means of Murphy's button. Recovery was uneventful.

A condition which may come up in the differentiation of acute appendicitis from peritonitis the result of perforation other than that of the appendix itself is perforating typhoid ulcer. The history of typhoid with the characteristic prodromal stage, the nervous manifestations, the enlarged spleen, characteristic temperature, the presence of spots and the sudden onset of acute general abdominal pain with general abdominal rigidity would suggest perforating typhoid ulcer. A case in point is the following:

Dr. F., aged twenty-seven years, was admitted November 7, 1897. Enteric fever; perforative ulcer; free pus in abdomen.

Family History.—No tuberculosis or cancer in family. Family history good.

Previous History.—Had grippe six years ago; typhoid fever ten years ago.

Present History.—Ten days before patient was brought to hospital he complained of malaise and loss of appetite. Would arise in morning tired, and in the afternoon would feel worn out. Lived on milk and bread during this time. Complained of headache one week previous to admission. Bowels were rather constipated. Took aloin belladonna and strychnine pills almost every night. Two nights previous to admission his temperature was 102° F. (Only time that temperature was taken by him.) On Saturday night (the night previous to admission to hospital) patient partook of a meal consisting of sirloin steak, celery, bread and butter, coffee, a pear, and a peach. After eating dinner, he went to his office, where a number of patients were waiting. He saw only one when he was suddenly taken with severe abdominal pain, necessitating his going to bed. For this pain he took sulphate of magnesia, applied hot-water bottles to the abdomen, and drank freely of warm drinks. Pain in abdomen was severe, requiring morphine. Sunday morning the entire abdomen was distended, very rigid, and exquisitely tender, especially over lower right quadrant. I was called by Dr. Eckman in consultation, and after the examination we were convinced that there was a serious intra-abdominal lesion, most probably slow leakage from a perforated typhoid ulcer, as indicated by the history and the condition. We were, however, by no means certain that it was not a perforated appendix. I advised operation, emphasizing the fact that delay would be dangerous. Operation revealed a belly full of pus, with free gas in the abdomen. The appendix was intensely congested, and was removed. No attempt was made to locate the perforation, on account of the difficulty experienced in dealing with the intestines, which were greatly distended, so that, notwithstanding the small incision and the use of gauze packing, etc., it was almost impossible to keep them in the belly cavity. I therefore contented myself with thorough irrigation and drainage. The patient ran a typical course of typhoid of most severe type, complicated by several hæmorrhages. He was

transferred to my medical colleague, Dr. J. C. Wilson, and it gives me pleasure to report the patient's recovery.

The pathological reports show ulceration of the mucous membrane lining the appendix.

Extrauterine Pregnancy.—The history in these cases is usually that of partial or complete cessation of the menstrual flow for one, two, or more periods, generally accompanied by other symptoms of pregnancy, with collapse supervening upon an attack of acute abdominal pain. The pain is long-continued and paroxysmal, but not colicky. An irregular, bloody, vaginal discharge, generally lighter in color than the normal menstrual flow, and containing shreds of tissue, portions of the decidua, is present. Vaginal examination will detect a tender and sensitive mass in the cul-de-sac, unless the pregnancy is an abdominal one. In the majority of these cases there is a history of sterility for five or six years previous to the abnormal conception.

When the product of conception occupies the fimbriated extremity of the right tube, the points of differentiation are more difficult, owing to the close proximity of the lesion to the appendix, and to the negative result of examination *per vaginam* prior to rupture. Should the two conditions occur coincidently it will be wellnigh impossible to differentiate between them. The chief points to be borne in mind, however, if such is not the case, are the history and the absence of inflammatory symptoms prior to the rupture of the extra-uterine sac and the presence of inflammatory symptoms in appendicitis.

Suppurating Ovarian Cyst.—An appendical abscess and a small suppurating ovarian cyst on the right side present some symptoms in common which may give rise to difficulties in diagnosis. These symptoms are: painful tumor in the right iliac fossa, which may be made out by vaginal, bimanual, and external examinations; symptoms of septicæmia; hectic temperature, and history of previous gastric and urinary irritation. The differences, however, are marked and can be dis-

tinguished by careful consideration of the symptoms. In ovarian cyst the onset is gradual and a history of some infection can generally be elicited. The pain is constant and of a dull character; by pressure the significant "ovarian pain" may be produced, differing from the colicky appendical paroxysms. The rigidity of the abdominal wall is not so marked as in appendicitis, while the tumor itself is more elastic, having apparently thinner walls and a more regular outline.

Ovarian Cyst with Twisted Pedicle.—An ovarian cyst with a twisted pedicle gives, as a rule, a history of a slowly growing tumor, which is so frequently unaccompanied by pain that its presence is often unsuspected until the accident occurs. The onset of the acute symptoms of a cyst with a twisted pedicle is sudden, and is usually caused by excessive peristalsis of the intestines or by sudden changes of the position of the body, causing the tumor to rotate on its pedicle. If the twisting is complete enough to shut off the circulation, the walls of the cyst will rapidly become gangrenous and the patient profoundly septic, with localized peritonitis soon becoming general. Here, again, is seen a resemblance to an attack of appendicitis with abscess-formation; but the difference in shape, the elasticity, the slow growth preceding the sudden onset, the difference in the character of the pain and tenderness, and the lessened degree of rigidity should enable one of experience to distinguish between the two. If, however, for any reason it is impossible to make a differential diagnosis, I would advise the lateral incision as the one to be chosen, because appendicitis is so much more common an affection that the chances are in favor of its being the cause of the symptoms. If it is an ovarian cyst, the lateral opening may be closed and a median incision made for its removal. The median incision for appendicitis is illogical, unwise, and in many instances will present anatomical impossibilities. Where the appendix lies behind the cæcum and observes one of the northerly directions, and especially if adherent, it will present difficulties in the removal even

through the ordinary incision. It is, therefore, plainly to be seen how much more difficult it would be to attempt its removal through a median opening. These difficulties are greatly increased when there is pus-formation, and, further, the dangers of peritoneal infection are greatly multiplied by any other than the lateral opening.

PATHOLOGY OF APPENDICITIS.

As a result of the desire to further investigate the part which micro-organisms, as well as the other causative factors, play in the production of appendicitis, the pathological department of the German Hospital of Philadelphia has, since January 1, 1897, been directing its efforts to the examination of the diseased appendices removed by operation in the institution.

At the time of writing the number of appendices removed is 225. A partial *résumé* of 200 of this number will be included in this report.

A careful research into the manner of invasion of the micro-organism has clearly demonstrated that they escape into and through the wall of the appendix on account of erosion of the mucous membrane. Of 200 appendices examined there was erosion of the mucous membrane in 149.

That faecal concretions and *débris* are in many cases responsible for this change there is no doubt, as in 149 there were found erosions from faecal concretions; in 129 there was *débris*, and in 74 there were both,—*débris* composed of mucus, epithelium, and degenerated mucus.

Various organisms have been found present within the cavity of the appendix, occupying its wall, in the exudate surrounding the appendix, and in the pus-cavities.

That the appendix is not more frequently the seat of invasion of micro-organism is due, I believe, to the fact that the mucous membrane is intact. When erosion occurs these organisms have a free outlet and become at once active, causing acute inflammation of the walls of the appendix, due to

the migration, multiplication, and destructive action of the bacteria and their ptomaines.

The method used to discover the presence and type of micro-organisms in these cases has been to inoculate agar-tubes with the pus of the appendical abscess immediately upon opening the same, and after removal to test the contents of the cavity of the organ in a like manner.

The appendices are photographed and their gross appearance noted, together with the history of the case; they are weighed and measured, hardened, and sections cut and stained. A microscopic examination is made of both longitudinal and circular sections. As a result of this careful manner of observation, we have been able to demonstrate the presence of micro-organisms in all the coats of the appendix,—mucous, submucous, muscular, and peritoneal.

Clinical Diagnosis: Chronic, 113; acute, 87.

Ages of Patients.—One to ten years, 5; ten to twenty years, 43; twenty to thirty years, 76; thirty to forty years, 49; forty to fifty years, 14; fifty to sixty years, 6; sixty to seventy years, 1; 5, age not given.

Number of Attacks.—Forty-seven in one; 94 in two; 25 in three; 9 in four; 7 in five; 10 in six; 3 in seven; 2 in nine; 1 in ten; 1 in sixteen. One attack was continuous for three weeks.

PERCENTAGE TABLE.

In the 200 cases the percentages of diseased conditions were made out as per following table: 69 per cent. of operations occurred in males; 31 per cent. of operations occurred in females. Fifty-seven and a half per cent. were constipated; 15.5 per cent. had diarrhœa; 8.5 per cent. had normal stools; 65.5 per cent. had vomiting; 43.5 per cent. operation during an attack; 50 per cent. operation after an attack; 6.5 per cent. operation between attacks; 24.5 per cent. complicated by abscess; 15.5 per cent. complicated by peritonitis; 12 per cent. complicated by adhesions; 16 per cent. complicated by cæcum or bowel involvement; 10.5 per cent. complicated by pus free in peritoneal cavity; 11 per cent. complicated by

gangrene of appendix; 19.5 per cent. complicated by perforation of appendix; 44.5 per cent. contained concretions; 64.5 per cent. contained *débris*-epithelium, mucus, etc.; 37 per cent. contained both; 74.5 per cent. had erosions of the mucous coat; 65.5 per cent. had hypertrophy of muscular coat; 25 per cent. were partially occluded; 6.5 per cent. were completely occluded; 56.5 per cent. operated for chronic disease of the appendix; 45.5 per cent. operation for acute disease of the appendix; 91.5 per cent. recovered after operation; 8.5 per cent. died after operation.

The same predominant type of micro-organism in each instance was found to be in the lumen of the appendix, in its wall, and in the lymph and pus.

The most commonly found of these was the bacillus coli communis.

Streptococci and staphylococci were also found in a certain percentage of cases to be the exciting factors in the production of the attack.

The serum test for the colon bacillus, according to the Widal reaction for typhoid fever, has also been employed. The substitution of the bacillus coli communis was made in place of that of typhoid, the Eberth bacillus.

The reaction of the blood from cases of septic appendicitis produced by the bacillus coli communis immediately showed arrest of motility and clumping of the colon bacillus.

REPORT OF THE PATHOLOGICAL EXAMINATION OF TWO HUNDRED CONSECUTIVE CASES OF APPENDICITIS.

MALES, 138.

Constipation, 113 }
 Diarrhœa, 31 } 3 both.
 Normal bowels, 17.
 Digestive disturbance, 45.
 Vomiting, 131.
 Operation during attack, 87.
 Gangrene, 22.
 Perforation, 39.
 Recovery, 189.
 Concretions, 89 }
Débris, 129 } 74 both.
 Partial occlusion, 50.

FEMALES, 62.

Operation after attack, 100.
 Operation between attacks, 13.
 Abscess, 59.
 Peritonitis, 31.
 Adhesions, 84.
 Cæcum or bowel involvement, 32.
 Pus free in abdominal cavity, 21.
 Death, 17.
 Erosion of mucous coat, 149 }
 Hypertrophy, 131 } 98 both.
 Complete occlusion, 13.

A perusal of the foregoing table will give a definite index as to the nature of the investigation and observation.

AGE PERCENTAGE.

Two and a half per cent. occurred between one and ten years; 21.5 per cent. between ten and twenty years; 38 per cent. between twenty and thirty years; 24.5 per cent. between thirty and forty years; 7 per cent. between forty and fifty years; 3 per cent. between fifty and sixty years; 0.5 per cent. between sixty and seventy years; six cases ages not noted.

Of the 113 chronic cases operated upon the percentage of recoveries was 100. Of the 87 acute cases 81.3 per cent. operated upon recovered. The mortality 18.7 per cent.

Two of the fatal cases died from metastatic abscesses of the liver.

TREATMENT.

Of the numerous methods suggested for the treatment of appendicitis early operation is, in my opinion, the only one upon which reliance may be placed for a definite, curative result in the vast majority of cases. Surgical interference, instituted promptly, as I have always advocated, will in the hands of the experienced operator be followed by a mortality of not more than 1 per cent., while at the same time removing the danger of subsequent attacks, any one of which may be attended by a fatal result. A reference to the table, incomplete so far as details are concerned, of the cases operated upon in the German Hospital this year will bear out what I have claimed. Before an audience composed largely of general practitioners it gives the subject a more practical side to speak of the medical as well as of the surgical treatment.

All cases of appendicitis I classify under two heads,—namely, acute and chronic. The chronic variety includes cases described by writers as subacute, recurrent, and relapsing. Let us first consider the treatment of the acute variety, which embraces the acute catarrhal, the fulminating, and the per-

forating cases. In instituting the proper medical as well as the proper surgical treatment it may be remarked that of first importance is rest, by confining patient to bed; second, the relief of the pain, which in the majority of cases is accomplished by the application of cold in the shape of ice-bags to the seat of greatest tenderness, one or more being used as the case may be. The rubber coil offers a more convenient means of applying cold; and here I may remark that this form of treatment must not be used in a half-hearted way, or the good effect of the agent will not be obtained; third, the administration of a full dose of a mild purgative, and preferably one that will empty the alimentary canal of all irritating material. Personally I prefer castor oil. Should there be an objection to the oil from the presence of persistent sick stomach, my second choice is powdered calomel, administered in fractional doses with bicarbonate of soda.

In the absence of sick stomach, and when castor oil is objectionable for any reason, Rochelle salts, given in one-drachm doses every two hours till a free bowel movement is obtained, is a satisfactory purgative.

The diet should be liquid, particularly milk, peptonized if necessary, and this may be varied by the occasional administration of broths. The sick stomach, so often present early in the disease, subsides, as a rule, when the pain has localized itself in the region of the appendix. Should sick stomach persist, however, the application of a small fly-blister over the epigastrium will often give relief. It will be noticed that thus far I have said nothing about morphine or opium. While I regret to think of it, I believe that the practice of most physicians, when called to see a patient suffering with acute abdominal pain, is to immediately administer a hypodermic of morphine instead of first trying to ascertain the cause of the pain, which, if found to follow the taking of indigestible food, requires a purgative. To give morphine to the exclusion of purgative medicine under these circumstances is as irrational as it would be to withhold an emetic from a patient who has recently swallowed a poison. Mor-

phine or opium, it matters not which, given in the presence of an acute indigestion, which is nearly always the forerunner of acute appendicitis, is objectionable for several reasons; it has a constipating effect; it interferes with the normal secretion, and therefore adds nothing to the already embarrassed digestion; it favors decomposition of the indigestible matter in the bowel, and consequent ptomaine poisoning. Does this not suggest to the rational mind that opium or morphine is the most harmful drug that can be prescribed in a case where appendicitis is suspected? But the strongest objection to the administration of opium, or its derivatives, early in the disease is that it masks symptoms, in this wise obscuring if not preventing an early diagnosis. If the administration of opium or any of its preparations is ever allowable in appendicitis, it is only when purgative medicine is given at the same time. Even under these circumstances I should caution against its administration in the presence of a better, less treacherous, and much more valuable agent,—namely, the local application of ice. The part cold plays as an anodyne is as important as are any of its therapeutic properties. Few are there among you who have not seen the pain, tenderness, and rigidity of many a case of suspected appendicitis vanish after the free action of a gentle purgative. If this is not a convincing argument against medicines which will confine the bowels, to say nothing of their other injurious effects, I know not whereof I speak.

The mortality of appendicitis has been most favorably influenced by the early administration of purgative medicine and the early application of the knife. It is my mission this afternoon to plead with you in behalf of purgation and early operation in this disease, which has been the cause of more deaths than any other acute intra-abdominal affection. I therefore beg of you to allow one, speaking from experience, to influence you. If I do not speak of counter-irritants other than cold, you will undoubtedly be surprised. Permit me to say that I am convinced that cold is the only one of these agents that offers any therapeutic advantage whatsoever in

appendicitis. Of the rest some are at best harmless, but most are undoubtedly capable of doing much mischief. A difference of opinion still exists as to the advisability of the administration of purgatives after the disease has advanced, or in the presence of a distended belly, etc. The experience of those who have seen most of this disease is in accord with the belief that purgatives are capable of doing much more good under these circumstances than can be obtained from any other class of drugs. Personally, I have never regretted purging a patient suffering from appendicitis. The writers who oppose the use of these drugs are evidently limited in their experience with this disease, otherwise they would not so believe. The apparently strong argument offered against the giving of purgatives when the disease is far advanced is the danger of liberating pus into the peritoneal cavity from the tearing of adhesions by the peristalsis. I am positive, after a considerable experience, that the good from purgation will overbalance by far the harm done by the active peristalsis, etc. But the treatment I advocate, and when possible carried out,—namely, early operation,—does away with having to guard against pent-up pus.

I wish to emphasize the fact that the appendix once the seat of an inflammation is never restored to the condition in which the inflammatory process found it, as a careful microscopical study will prove. This being an absolute fact, there is but one cure,—namely, removal of the affected organ. When I am brought face to face with a case of appendicitis, I profess to know but two things in regard to the disease, one of which is that the disease is appendicitis, and the other that the appendix should be removed.

Under the best-directed medical treatment all that can be hoped for in any given case of appendicitis is temporary recovery. I make this statement in spite of what I know of the views entertained and promulgated, not only by the learned members of the profession in our country, but abroad as well. I make this statement, too, fully appreciating all it carries with it, and if I am privileged to ask why, my answer

is because a sufficient number of appendices have been carefully studied microscopically in the Pathological Laboratory of the German Hospital to warrant the assertion. We must admit that this is definite knowledge, while statements mean nothing from men who perhaps have never looked through a microscope at the section of an appendix once inflamed, nor have seen an inflamed appendix within the living belly cavity of a dozen subjects.

When a general peritonitis has developed, invariably septic, the following line of treatment has in my experience been followed by the best results.

The entire abdomen is at once packed in ice; good-sized doses of calomel are given on the tongue; strychnine hypodermically; assafoetida suppositories, and all nutriment with whiskey by rectum. When there is persistent sick stomach, a fly-blister is applied to the epigastrium.

The treatment above referred to offers in my experience the most favorable prospect, not only in septic peritonitis following operation, but in septic peritonitis in general. That the prolonged application of extreme cold arrests bacterial invasion and alters the soil which would otherwise be favorable for further bacterial propagation I am convinced, having used it successfully in a large number of cases. The anæsthetic property of the ice is also well demonstrated. It is seldom that an anodyne is called for when the ice is used methodically and continuously. But the ice treatment will not accomplish the desired result if used in a half-hearted way. Its good effect is also seen in the stimulation of the muscular coat of the bowels, in this way favoring the expulsion of flatus with relief of the distention so annoying to the patient, particularly when the maximum amount of gas is in the upper abdomen, pressing upon the diaphragm and embarrassing the heart-action as well as respiration.

The description of the operative treatment for appendicitis can best be disposed of by describing the operation in the absence of and in the presence of pus. The earlier the operation is done in the acute cases the less likelihood is there

of meeting with pus, yet, in a certain class of cases, pus will be present be the operation done ever so early. We all agree that the removal of the appendix in the absence of pus can be done with a greater degree of safety to the patient than under the opposite condition. Did it become necessary for any of us to have our appendix removed, we certainly would prefer not to have pus present. The old practice was not to think of operation in these cases until the presence of pus could be diagnosed. This was in keeping with other old practices of which more modern teaching has shown the fallacy,—namely, that a wound was not healing unless it was bathed in so-called healthy pus. We will agree further that the earlier the operation is done the greater are the chances against the presence of pus. I could go on, did time permit, and offer argument upon argument in favor of early operation, knowing that not one of them could be logically met by a stronger one in favor of delay; but this I feel is unnecessary in the light of the practical deductions of experienced operators. The same holds good in arguing in favor of operation in chronic appendicitis. I have never failed to convince physicians of my views who have witnessed a number of these operations in the acute and chronic cases early, very early, late and very late. Would that it were possible to present these object-lessons to those of the profession who are still sceptics. The stand I have taken is to remove the appendix in the presence of pus, and not to content myself by simply evacuating the abscess. I grant, however, that the removal of an inaccessible appendix in the presence of pus or of an abscess should not be attempted by the occasional operator. I know of no class of work calling for greater skill and capable of taxing the expert more than some of these appendical abscess cases. This does not discredit the operation, but it is an argument against faulty technique. In the presence of infectious pus it requires but the slightest mis-carriage of the technique to cost a human life. The success in dealing with these cases is wholly due to the proper disposition of sterile gauze and a correct knowledge of the anat-

omy of the part. The danger of leaving an infected appendix, the train of serious sequelæ which may result, etc., I have called attention to elsewhere. The position which an abscess resulting from appendicitis may hold is behind the cæcum and colon, beneath the mesentery, immediately to the inner side of the colon, the latter with coils of small intestine, plus a certain amount of exudate, forming the wall; or in the midst of coils of small bowel alone; or in the neighboring great omentum; or in the pelvis; or free in the general peritoneal cavity. When pus has developed in the peritoneal cavity, the earlier the operation is performed the greater will be the percentage of recoveries. The secret of dealing successfully with collections to the inner side of and distant from the cæcum is in first cutting down upon the cæcum, locating the site of the collection, and walling off with gauze; then making a secondary opening into the abdominal cavity upon the opposite side of the collection, introducing secondary packing, and attacking the abscess and removing the appendix through the primary incision. One word about dealing with the appendix. When practicable,—and this is so in all the acute cases operated upon within the first twelve or eighteen hours, and in nearly all of the chronic cases,—the appendix should be cut out of the cæcum, and the latter closed after the manner of uniting any ordinary intestinal wound. The advantages this plan offers are many, chief among which is the avoidance of secondary abscess either at the site of the remaining base of the organ or within the walls of the cæcum, and the diminished risk of sinus and fistula due to the base of the appendix becoming attached to the line of the incision, thus opening up free communication between the cæcum and the surface of the belly walls.

VALUE OF CASTRATION TO FACILITATE DETECTION OF STONE IN THE BLADDER, IN THE PRESENCE OF PROSTATIC HYPERTROPHY.¹

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THE result of a trial for malpractice of a prominent physician of Baltimore induces the writer to lay before the profession the histories of four cases of double castration, undertaken with a view to producing atrophy of the prostate gland, in order to relieve the symptoms of prostatic obstruction and make an examination of the bladder practicable, and to determine the existence, or otherwise, of the presence of urinary calculi.

These cases may possibly be of interest to the profession, as they, in a measure, demonstrate that in some instances positive diagnosis of the existence of stone in the bladder is impossible, where hypertrophy of the prostate exists, especially if the middle lobe be so much enlarged as to render the passage of the stone-searcher impracticable, unless a suprapubic cystotomy or a double castration be resorted to; the latter operation, it is now conceded, causes atrophy of the hypertrophied gland.

When the enlarged gland has sufficiently dwindled, the stone, if it exist, can be readily located and extracted by suprapubic cystotomy, or crushed by lithotripsy.

A brief history of the cases is here presented:

¹ Read before the Surgical Section of the College of Physicians of Philadelphia, December 10, 1897.

CASE I.—G. H., seventy years of age, had been suffering from symptoms of cystic stone, which gradually intensified, for the past five years. When first seen he stated that he voided his urine many times during the day and night. He experienced great pain at the meatus urinarius at the termination of each act of micturition. The urine often contained blood, which at times was passed after urination. The urine was cloudy, offensive, with an alkaline reaction, and contained a small quantity of albumen, with pus, blood-corpuscles, and crystals of phosphates and oxalates. The percentage of urea was low.

Examination per rectum revealed an enormously hypertrophied prostate.

Many attempts had been made to pass a stone-searcher, but without success. The only instrument that could be introduced into the bladder was a small-sized, rat-tail, rubber catheter, which was passed with difficulty. When the catheter was introduced the bladder was found to contain five ounces of residual urine. The capacity of the viscus was six and a half ounces.

The patient's sexual functions had long been lost. He was told that he was probably suffering from stone in the bladder, but that it was impossible to make a positive diagnosis until the enlarged prostate, which caused the obstruction, had been reduced in size. A double castration was advised. His consent having been given, the operation was performed. Two weeks later a stone-searcher was readily passed, and the existence of calculi easily detected; these were removed by the operation of suprapubic cystotomy, and the patient made a rapid recovery.

CASE II.—L. T., sixty-five years old; mariner. History precisely similar to Case I. The obstruction produced by the enlargement of the prostate permitted the passage of a very small Thercin catheter only. Double castration was performed. Fourteen days after the operation a stone-searcher was readily introduced, and a large-sized calculus was found, which was removed by suprapubic cystotomy. The patient made a rapid and uneventful recovery.

CASE III.—G. C. B., manufacturer, sixty-two years old. Affected with hypertrophied prostate. In addition to the usual symptoms he complained of great pain in the glans penis, especially after urination. He frequently passed blood before, during, and after the act of micturition. Pain and hæmorrhage were increased by riding over rough roads. Had had two attacks of

retention of urine. The middle lobe of the prostate was found to be greatly enlarged. A stone-searcher was introduced with difficulty, owing to the enlargement of the middle lobe an exploration of the bladder was not possible.

The sexual powers of the individual were completely lost, and he willingly gave his consent to the performance of a double castration preliminary to cystotomy.

Ten days after this operation the stone-searcher was readily passed, and two good-sized calculi were found in the pocket posterior to the prostate, and were removed by a suprapubic operation. The patient left the hospital one month after entering the institution entirely relieved.

CASE IV.—H. Q. M., seventy-one years old, retired merchant, stated that he had had "trouble with his bladder" for the seven years preceding his application for treatment. He complained of pain in the head of the penis, neck of the bladder, and over the pubes after passing water. Had frequent attacks of hæmaturia, and one attack of ischuria. The flow of urine from the bladder was very difficult to start. The urine was cloudy, offensive, alkaline; contained albumen, pus, leucocytes, and crystals of phosphates and oxalates. The prostate was very much enlarged; the only instrument that could be introduced in the bladder was a very small, hard-rubber English catheter. Double castration was performed, and fifteen days later the prostate had sufficiently shrivelled to allow of the introduction of a stone-searcher, when a calculus was readily located. It was small and was easily crushed by the use of Forbes's lithotrite. Patient made a slow but complete recovery.

In each of these cases there was marked obstruction of the urethra, due to senile hypertrophy of the prostate, complicated with chronic cystitis, with symptoms of prostatitis and stone in the bladder. In no case was it possible to make a positive diagnosis; in but one could the stone-searcher be introduced, and then, owing to the great enlargement of the middle lobe, it was impossible to utilize the instrument for the purpose of exploration.

The existence of a calculus was suspected in each case, and the patients were distinctly informed that double castration was but a preliminary operation.

Two of the individuals were sent to me by their respec-

tive family physicians, with a diagnosis of stone in the bladder; in neither had hypertrophy of the prostate been suspected, no physical examination having been made.

The two others were referred to me as cases of "obstructive hypertrophy of the prostate"; the complication with vesical calculus not having been suspected.

A study of the history of the cases here submitted would seem to warrant the conclusions that, in cases of hypertrophy of the prostate, when enlargement is so great that a stone-searcher cannot be passed, or if it can be inserted, a thorough exploration of the bladder cannot be made. A positive diagnosis of calculus is not feasible. That where the hypertrophy is so great that a positive diagnosis of stone in the bladder cannot be made, a double castration is an entirely justifiable operation as a preliminary measure to insure shrinkage of the hypertrophied gland, provided the patient has already lost his virile power, and is otherwise a proper subject for the operation. That a surgeon is not to be held blameworthy if he is unable to say positively whether a vesical calculus does or does not exist, if the entrance to the bladder is obstructed by the condition of the prostate to such an extent that a stone-searcher cannot be introduced, or, if inserted, cannot be properly utilized to explore the organ; or, if the existence of a calculus cannot be detected by resorting to the use of the X-rays. (In this connection it may be remarked that two of the four cases whose history has been recounted in this paper came under the writer's care after the great discovery of Röntgen had been announced to the world, and that this method was used as a means of diagnosis, but failed in each instance.) That, in all cases of hypertrophy of the prostate, where exploration of the bladder by the stone-searcher is either impossible or negative, and where double castration is recommended, the patient should be advised of the possibility of the existence of a vesical calculus that can only be detected, with certainty, after the gland has become sufficiently atrophied to allow of the passage of the sound. Should a calculus be present, it can be readily removed by a subsequent operation.

A STUDY OF THE CASES OF DISEASE OF THE
FEMALE GENERATIVE ORGANS PERSON-
ALLY TREATED DURING TEN YEARS' WORK
IN THE METHODIST EPISCOPAL HOSPITAL
IN BROOKLYN.

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(Continued from page 150.)

Laceration of the cervix, in degree sufficient to require plastic repair, has been found in 107 instances. Observation of these cases has convinced me that these lacerations, simply as deformities, entail no disability and call for no surgical interference; also that the supposed involvement of sensitive nerve terminals in the cervical cicatrix, producing pelvic pain and general reflex nervous disturbances, must be very rare, if it ever occurs, for in none of the cases under examination was any such peculiar cicatricial tenderness discoverable. The local sufferings and the general disturbance in these cases were due in all cases to complicating metritis and endometritis. These inflammatory conditions of the uterus, however, evidently owed their origin to infection through the cervical tear originally; and that they were perpetuated by the eversion, and consequent exposure of the cervical mucosa to vaginal friction and bathing in the vaginal secretions, is shown by the rapid improvement in the uterine inflammation which almost invariably followed upon the repair of the laceration by operation, an improvement which was much more rapid and definite, as a rule, than in the cases of chronic metritis which were not associated with laceration

of the cervix. The value of plastic restoration of the cervix as a part in the measures required for the treatment of the accompanying metritis and endometritis has been so constantly manifested in these cases, the procedures involved are so simple and safe, and the degree of security against recurrence of infection is so much greater than when the tear is neglected, that the attempts to minimize the importance of trachelorrhaphy, which are occasionally made by some writers, are wholly without pathological basis or clinical justification. In any given case, however, the best results can only be secured when all the elements of disease or deformity which the case presents are recognized, and each receives its appropriate treatment. Thus of the 107 cases of cervical laceration under consideration, there were fifty which were complicated with notable laceration of the perineum, in five of which there was an extreme prolapse of the uterus; in twenty-two other instances there was a marked degree of retroflexion, and in four cases an ovaritis was present.

The *technique* involved in efforts at repair of a laceration of the cervix of the uterus requires no special instruments nor materials, and does not differ in its principles from similar work in other parts of the body. The preliminary cleansing should include scrubbing and disinfection of the vulva and vagina, and curettage of the uterine cavity, as described when speaking of the treatment of endometritis. The position of the patient and the method of exposing the part to be operated on should be as shown in Fig. 2. For the trachelorrhaphy itself an ordinary scalpel, with blade of medium size, a pair of mouse-toothed tissue-forceps, a full-curved surgical needle, of medium size, and a pair of needle-forceps are all the instruments required. For sutures a medium-sized thread of chromicized catgut answers most admirably; sometime during the third week after insertion such sutures will have become absorbed sufficiently to cast off the knots which slip away along the vagina, requiring no attention after they have once been tied. The first step of the operation should be free incision of the apex of the laceration angle from within outward;

if the laceration is bilateral, the incision should be made on both sides; along the edges of the cervical mucosa, now freely exposed by the separation of the cervical flaps, the scalpel is next carried, marking out the inner side of the triangular surface to be refreshed, which refreshing is then done by the scalpel while the tissues are steadied by the toothed forceps. Whatever bleeding there may be will be fully controlled by the sutures when tied. All the sutures are inserted before any are tied; four is the usual number required to a side. After the tying the suture line and adjacent vaginal mucosa is well dusted with powdered oxide of zinc; if further operation is required it is then proceeded with, perineorrhaphy, with or without colporrhaphy, having been added in about one-half of all the cases, while shortening of the round ligaments or suture of the fundus to the anterior abdominal wall has been required in about 20 per cent. of the cases.

When trachelorrhaphy alone has been done the patient remains in bed for two weeks, at the end of which time she receives a vaginal douche and is allowed up, no interference at any time for removal of the sutures is required, but the repaired cervix is inspected for purposes of record before the discharge from the hospital of the patient.

The *results*: Uncomplicated and firm healing of the wounds has ensued in all the cases thus treated, and with the coincident improvement of the metritis, already described, marked, and in most cases permanent, relief to the previously existing pelvic discomfort has been secured.

Retroflexion of the Uterus.—In seventy-one cases retroflexion of the uterus was either the chief pathological condition present, or formed a complication requiring special treatment. They were all associated with some grade of metritis and endometritis, and the pain and disability complained of were undoubtedly in great measure due to these latter conditions. Lacerations of the cervix or of the cervix and perineum were present, and were repaired by operation in thirty-two cases; a varying degree of salpingo-ovaritis was also present in six of these cases. In sixteen cases the infec-

tive inflammation of the appendages was the chief complication, producing in some cases extensive and dense adhesions, fixing the fundus of the uterus in its retrodisplacement.

The records of these cases state with some definiteness the time during which pain or disability from the uterine condition had existed before entering this hospital in forty-seven cases; the shortest period was one year, the longest period was twenty-two years, the average period was six years, and the total years of suffering represented in this limited number of cases were 287. By far the largest proportion of these seventy-one patients were young women; forty-nine of them being between twenty and thirty-five years of age, the average age of this group being twenty-eight years. Of the remaining twenty-two, only two were over fifty years of age.

The character of these cases, the main features of which have been outlined in these suggestive figures, was such as to make operative procedure for immediate and permanent correction of the displacement and distortion imperative. It was for this that most of them, after having exhausted every non-operative method of treatment during years of fruitless effort, came to the hospital. In fourteen cases, however, no operation for the retrodisplacement was deemed necessary, but by repair of lacerations, curettage, and appropriate topical treatment for relief of the endometritis, and by manual reposition of the uterus, supplemented by the insertion of a double-lever pessary in some cases, great improvement was secured. Two of these cases are known to have relapsed, having returned after some months and submitted to shortening of the round ligaments. It is quite probable that in others also of this group relapse may have occurred for which they went elsewhere for treatment, but some are known to have remained permanently cured. The greater number of these non-operated cases (eight out of the fourteen) were treated during the first two years of the hospital's work, before the increasing experience in the diminished risks and the positive and permanent advantages derivable from operation had demonstrated to the satisfaction of the surgeon

the superior value of the operative methods available. This remark applies to the inveterate and complicated cases of retrodisplacement which find their way to the wards of a hospital, for which class of cases it has become evident that the highest and most lasting, as well as the most speedy benefit is to be obtained by proceeding at once to such operative measures as will restore and keep the uterus in its natural position in the pelvis, will insure the unimpeded normal circulation of the blood in the uterine vessels, and will facilitate the ready exit of all discharges from its cavity.

Of the various operations which have been suggested for correcting uterine retroflexions and versions, the shortening of the round ligaments, and the attachment by sutures of the fundus to the anterior abdominal wall just above the pubis, have alone been resorted to. The positiveness with which each of these procedures, in appropriate cases, accomplishes the permanent retention of the uterus in anterior position, the facility and freedom from risk with which the required operative steps may be taken, and the minimum probabilities of remote or secondary disadvantage entailed by them, have caused these procedures to be regarded with a confidence and appreciation that have increased with each succeeding year of experience.

Shortening of the round ligaments was resorted to in nineteen cases. In eleven of these cases no other operative work other than curettage was done; the pelvic floor was intact, only a mild grade of metritis was present; the uterus was free from adhesions, but, owing to the flabbiness of its own texture and the relaxed condition of the round ligaments, would at once fall into retroflexion when the patient assumed an erect position, bending back over any tampon or pessary that could be inserted in the vagina for its support. In one of these cases examination six months later revealed that the uterus had again become retroflexed. This was one of the first cases operated upon; the round ligament was sought at the external ring; the record states that it was drawn out to the extent of two inches, and that traction upon

the fundus of the uterus through the shortened ligaments was not as marked as had been expected. The operative technique was evidently defective. In all the remaining cases the result, as far as the retention of the uterus in anteposition is concerned, was perfect, but in two of them, who were young, unmarried women, the dysmenorrhœa, the pelvic pains, and the general neurasthenia, which had been prominent symptoms before operation, still persisted, but little if any modified by the alteration in the position of the uterus. One of these patients was eighteen months afterwards subjected to an abdominal section at another hospital, and found to be suffering from ovarian sclerosis and microcystic degeneration. The same condition probably existed in the other case, and could have been determined with exactness and received proper attention in the course of a suprapubic hysteropexy. It is fair to state that these cases occurred during the first years of the period under consideration, when the full significance of the complex of symptoms presented by them had not yet been fully grasped by me. They belong to a class of cases in which the ovarian condition is of more importance than that of the uterus, and the control of the uterine distortion is easily effected as an incident in the course of the procedures required by the ovarian disease.

Of the eight remaining cases, in seven of them trachelorrhaphy was first done, combined with perineorrhaphy in three instances. In one case perineorrhaphy only was done.

The Technique.—The experience gained in the earlier cases of this series and consideration of the relations of the round ligament in the inguinal canal caused me, after the first few operations, to agree with those operators who recommend that the ligament should be dealt with as it enters that canal at the internal ring, and this has been the course pursued in all the cases, except the three or four named. The point of emergence of the round ligament into the canal is midway between the anterior superior spine of the ilium and the spine of the pubis, and immediately above the ligament of Poupart. Here by a suitable free incision through the

skin and superficial fascia and fat, and by a more restricted one through the aponeurosis of the external oblique, the ligament can be found and isolated with certainty and facility; it is hooked out of its bed as a loop, and by moderate traction is gradually drawn out from within the abdomen until the fundus of the uterus is brought up to the pubis. About three inches of slack are usually thus produced. As the ligament emerges its peritoneal covering becomes apparent, investing it like the inverted finger of a glove; this is readily stripped back and the denuded ligament alone secured for suture. The superior firmness of the adhesions formed in the healing of such a denuded musculo-fibrous cord among the tissues held in contact with it by suture guarantees an absolute obliteration of the canal and complete protection from hernia. For anchoring the ligament, buried sutures of fine chronicized catgut are used. The first suture is applied at the level of the internal ring and catches the ligament of Poupart, then piercing the round ligament, it takes in the lower edge of the internal oblique. Two or three additional sutures are placed farther along the canal, at distances of about one-quarter of an inch from each other, each one securely attaching the drawn-out denuded cord to the walls of the opened inguinal canal. The distal portion of the round ligament is not disturbed from its insertion, and after the placing of the sutures as described a loop of slack ligament is left at the inner angle of the wound. This is then tucked up under the aponeurosis of the external oblique, the slit in which is closed by a running suture of ordinary catgut. The superficial portion of the wound may be closed according to the whim of the operator. The method at present in use for the closure of all such superficial operative non-infected wounds is to bring the fat and fascia together by a subcuticular suture of fine silver wire or silk thread. No drainage is required.

Suture of the fundus of the uterus to the anterior abdominal wall, **ventrosuspension of the uterus**, for the correction of retroflexion, was resorted to in thirty-eight cases.

Whenever the abdominal cavity has already been opened for the separation of adhesions or for dealing with diseased appendages, the uterus, when previously retroflexed, has been secured in anteposition by including its fundus in the sutures that close the lower angle of the abdominal wound. This has been the case in twenty instances, in fifteen of which total ablation (eight) or partial resection (seven) of diseased appendages was made, and in five the separation of adhesions was the only intraperitoneal interference required. In the remaining eighteen cases ventrosuspension was resorted to by choice as involving less traumatism and less prolonged anaesthesia than that involved in shortening the round ligaments, and at the same time affording opportunity for closer and more exact determination of the condition of all the pelvic organs.

In the earlier cases buried sutures of silkworm gut were used for the ventro-uterine fixation; in the majority of cases these healed in without disturbance either at the time or subsequently, but in occasional instances they seemed to act as local irritants and determine a slight infection that declared itself sometimes within a few days, sometimes not until after the lapse of some months, causing a limited suppuration and the formation of a sinus that would not close until the buried sutures were exposed and removed. Chromicized catgut has been used during the last two years, and has proven to be equally efficient as a means of fixation and to be free from the objections described as attaching to the non-absorbable silkworm gut.

In one case one year after the ventrosuture the abdomen was reopened for the relief of a persistent salpingo-ovaritis. The adhesions between the uterus and abdominal wall were found to have become elongated by traction, so that they formed a band about three-quarters of an inch in length and a half inch in width, a veritable suspensory ligament, which permitted considerable play to the uterus, but maintaining it in normal anteposition. The silkworm-gut sutures were found resting quietly in the cicatrix of the linea alba. It is quite possible, by denuding the surface of the uterus and the

portion of the abdominal wall, with which it is brought in contact, that such dense fibrous union shall be accomplished as to permanently fuse the surfaces together. This is the course to be pursued when ventrosuture is done for the relief of extreme prolapse, but is to be avoided in operating for relief of retroflexion only. In the latter case neither scarification nor denudation of the peritoneal surfaces should be done; the amount of irritation determined by the needle punctures and the incision in the ventral peritoneum will suffice to provoke such an amount of plastic exudate as will insure the retention of the uterus in its new position, but which will yet be yielding enough to relax and elongate with the lapse of time sufficiently to allow the uterus to resume nearly its natural level in the pelvis. No reports as to pregnancy occurring in any of the cases enumerated above have reached me. It is well known that in some instances serious interference with the natural expansion of the uterus in the course of pregnancy, and in the expulsion of its contents at term, has occurred after ventrofixation, and a case of the kind, occurring after a broad, dense fixation done for the relief of complete prolapse of the uterus will be detailed in the section treating of that condition, but that the yielding adhesions, formed in the course of ordinary ventrosuture, as here advised, should form a serious obstacle to the proper course or completion of pregnancy is unlikely, and the experience of many observers unites in the statement that in fact it is very rare. No mortality and no complications of the wound healing, other than the mild suture-infections already mentioned, or in some cases insignificant infection of the skin sutures, have attended any of the operations for the relief of retroflexion.

Prolapsus of the uterus, until it habitually either presented at the introitus or protruded as a tumor between the thighs, was a dominating condition in eleven instances; in eight of these the uterus was still retained within the vagina, and in three it was entirely extruded from the vulva with inversion of the vagina. In seven of these cases the descent of

the uterus was evidently referable to loss of support from the pelvic floor, occasioned by injuries sustained in childbirth, to which, however, must be added a special flabbiness of tissue in the individuals themselves, for in none of them was there present an amount of damage to the pelvic floor greater than was present in many other cases who presented no such extreme degree of prolapse. In the remaining four cases, in two the beginning of the prolapse seemed to date from falls that had been sustained, the effect being subsequently aggravated in one by the necessity for habitual prolonged standing in her calling as a sales-woman, and in the second by the frequent prolonged compression of the abdominal viscera into the pelvis by the descent of the diaphragm in efforts at sustained deep inspiration in vocalizing, the patient being by profession a singer. In a third case the patient, a feeble old woman, sixty-two years of age, had suffered from pulmonary emphysema and bronchitis for twenty years, and as the result of the spasmodic diaphragmatic pressure in her coughing the flabby pelvic floor had gradually given way, and the uterus had been driven out of the pelvis through the vagina. In the fourth case the uterine supports had given way while the patient had been attempting to lift a heavy weight. This occurred twenty-two years after the birth of her last child and five years after the menopause.

The methods adopted for relief, in addition to plastic operations for restoring or reinforcing the pelvic floor, which have already been enumerated in the section devoted to the perineum, consisted in either shortening the round ligaments or in fixing the fundus of the uterus to the anterior abdominal wall by sutures. The former procedure was resorted to in two instances; the results were satisfactory, but the more positive and certain fixation obtainable by the suture has led to the adoption of that method in all the other cases. In these cases the indication is to secure broad and firm ventro-uterine adhesions, which are readily obtained by denuding of peritoneum the surfaces to be brought into contact before approximating them. As a result in all these cases

the uterus has remained closely anchored behind the pubis. No discomfort from interference with the expansion of the urinary bladder has been complained of by these patients. Most of these women had passed the childbearing period, and hence the possible interference of such fixation with that function had not to be considered. In one case, however, serious difficulty did ensue from that cause, resulting in the death of the child and in serious hazard to the mother. The case is as follows:

A woman, twenty-eight years of age, was admitted on account of a constant protrusion of the cervix uteri from the vulva. When eleven years of age she had had a severe fall astride a plank, but was not conscious of permanent injury at the time. She began to menstruate at thirteen; at sixteen began to work in a confectionery, where she was compelled to stand continually, and shortly began to have backache and dragging pain in the pelvis; at twenty-one she married, and then it was discovered that her womb was threatening to protrude. She became pregnant, and in due time the child was born, breech first, tearing moderately the cervix and the perineum. At the end of seven years she applied to the hospital for relief, her condition being as described; the uterus adherent in retroversion; the cervix elongated and hypertrophied, the depth of the entire uterine canal being four inches. The uterus was curetted, the cervix amputated, the perineum restored, the abdomen was opened, and the fundus of the uterus enucleated from its adhesions and brought up into the lower angle of the wound, and sutured there. The patient made a smooth recovery from these operations and returned to her home; this was about July 1, 1893. She was seen by me two years later, at which time the fundus of the uterus was still in snug apposition to the abdominal wall, and the condition of the pelvic floor was perfect. She was about to remove from the city. One year later, in May, 1896, I received a letter from Dr. Lucia E. Heaton, of Canton, N. Y., stating that this woman was living in that place, was two months advanced in a pregnancy, and that she, the doctor, feared that the firm anchorage of the uterus would cause trouble as the pregnancy advanced. She wished my advice as to the propriety of

inducing an abortion. My reply was as follows: "The thing to do for her is to open the abdomen sufficiently to permit the detachment of the adhesions that are holding the uterus down. I wish you would send her down to this hospital for that purpose. Premature labor should be brought on only as a last resort to save life, but not merely to relieve discomfort."

The after-history of this case was reported by Dr. Heaton in the *American Gynecological and Obstetrical Journal*, of October, 1897. She says that after receiving this letter the course of the pregnancy was so favorable that it was thought best not to interfere. The foetus was persistently in the transverse position, but freely movable; the fundus uteri never rose much above the umbilicus. There was more than usual pain in back, but the

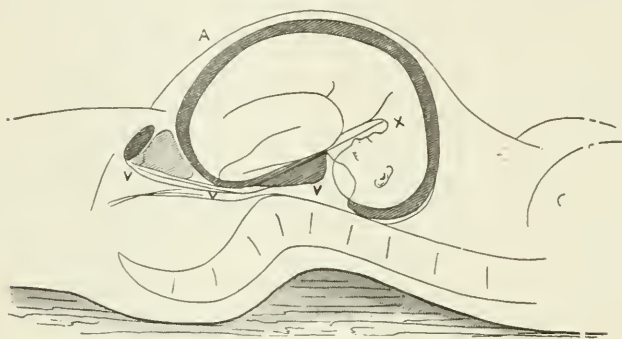


FIG. 3.—Diagram showing position of foetus in uterus, whose fundus is adherent to the abdominal wall just above the pubis. A, site of adhesions; v, vagina; x, shelf formed by the buckling of the uterus upon itself.

patient was otherwise comfortable, took long walks, and did her own light house-work until within two weeks of term. Labor-pains began December 29, 1896, but were so irregular and inefficient that at the end of sixty hours the os was only partially dilated, though the membranes had ruptured twenty-four hours before. The consultant, Dr. J. N. Bassett, then proceeded to manual dilatation and instrumental delivery. He reports that the head of the child was in a small posterior sac (compartment) and the body of the child in a large anterior sac (or compartment) of the uterus, as shown in the accompanying diagrammatic sketch furnished by Dr. Mark Manley, from Dr. Bassett's description (Fig. 3). After much effort the shelf-like fold of the

uterus (x, in the diagram) was pulled over the fundus of the child, when the head readily came into position at the brim of the pelvis, and the delivery was accomplished by forceps, the child being dead when delivered. The mother made an uncomplicated recovery.

The method proposed for the unmooring of the pregnant uterus in this case is practicable, and worthy of adoption in all similar cases. Should the adhesion have become elongated into a band simply dividing it would suffice, but if a broad area of close adhesion exists, the raw surfaces left by its cleavage would require coverings of peritoneum to be drawn over them; for the uterine surface this could be obtained from the omentum; for the abdominal wall the loose peritoneum immediately adjacent to the raw surface can be drawn over it with ease. No untoward effect upon the progress of gestation is to be apprehended from any such procedure.

In two of the instances of complete procidentia the general condition of the patients was such as to forbid that they should be subjected to prolonged anæsthesia, and I was forced to be content, in one case, with the simple suprapubic anchorage of the fundus uteri, a procedure capable of being accomplished in about fifteen minutes, and in the other with the addition also of a hasty perineorrhaphy. As a result in both these cases the uterus has been retained securely within the pelvis, but hernia-like protrusion of the relaxed posterior vaginal wall through the patulous vulvar orifice still persists. The question of the removal of the uterus in cases of procidentia has been considered, and its propriety rejected, for the reason that by its removal a most valuable adjunct to the after-support of the pelvic floor is lost. In cases of prolapse it is not the uterus that is at fault, but the pelvic floor, and by reposition of the uterus within the pelvis, and fixation of its fundus to the anterior abdominal wall above the pubis a new, firm, and reliable source of support to the pelvic diaphragm may be obtained, which is sacrificed by the removal of the organ. The retrenchment of the relaxed perineal and vaginal

tissues is of the highest importance, and by a combination of both procedures the most satisfactory and permanent results are to be obtained.

The after-history of one of these cases of procidentia contains features worthy of record:

The patient, forty-four years of age, the mother of five children, sustained laceration of cervix and perineum at the birth of the first child; after the birth of the fourth child she became

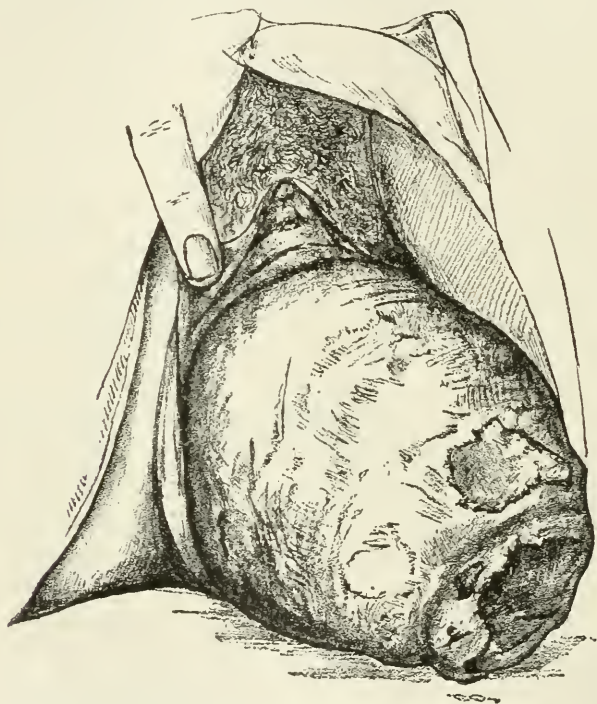


FIG. 4.—Complete prolapse of the uterus, with eversion of vagina, ulcerations of vagina, and cervix uteri.

aware of a mass protruding from the vulva; after the birth of her fifth and last child the size of the protrusion gradually increased until her entrance to hospital eight years later, when the condition was as shown in Fig. 4, executed from a drawing made immediately previous to operation. The vagina was completely everted, broad patches of ulceration were present on the most prominent parts of the vagina and of the cervix, the latter being

elongated and swollen, the rectum and the bladder were in some degree pulled down with the vagina.

The uterus was curetted, the hypertrophied cervix was amputated, colpoperineorrhaphy was done after the cutting away in ovoid strips of much relaxed and redundant tissue; this was supplemented by the application of a series of submucous circular silkworm-gut ligatures, after the method of Freund, as the uterus



FIG. 5.—Ventral hernia.

was pushed up and the vaginal walls were infolded. Finally, the fundus of the repositied uterus was sutured to the anterior wall of the abdomen. An uncomplicated and rapid recovery followed, and she was discharged with a massive and firm pelvic floor, and with the uterus firmly moored high in the pelvis. An examination made one year later showed the retention of the uterus in its new position to be permanent. Three years and a

half after the operation she presented herself again; the pelvic floor still firm and resistant, the uterus still in the position in which it had been placed nearly four years before, but with a large ventral hernia of the peculiar shape shown in Fig. 5. This had formed by the dilatation of that portion of the cicatrix of the suprapubic wound that was above the site of adhesion of the uterus; it had been disregarded by the patient until repeated attacks of threatened bowel strangulation compelled her to seek relief. Extensive areas of deep ulceration occupied the apex of the hernial tumor, as may be seen at *a* in the cut. The hernia was irreducible. When the hernial sac was laid open it was found to be filled with coils of small intestine agglutinated to the walls of the sac by many adhesions, which were easily broken down until the apex of the tumor was reached, when it became evident that the base of the ulcers was formed by the intestinal wall, which could only be separated from the adherent ulcerated skin-margins by careful dissection. This was fortunately accomplished fully without opening into the intestinal canal; previous disinfection of the ulcers had been made with 10-per-cent. solution of zinc chloride, and they were now infolded as far as possible by lines of Lembert suture, and the intestines finally were replaced within the cavity of the abdomen. The edges of the hernial ring were then pared and split so as to furnish broad musculo-fibrous surfaces for apposition, and were sutured by tiers of chromicized catgut sutures. An absolutely uneventful and favorable recovery followed.

Anteflexion of the uterus as the chief morbid condition, causing suffering from which relief was sought, appears upon the face of my records to have been present in six instances, but the records of the cases of recognized ovarian fibrosis and microcystic degeneration show that marked anteflexion of the uterus was also present in a large proportion of the cases of that condition (eleven out of twenty-four cases), being in those cases evidently an exaggeration of the normal anteposition of the organ, due chiefly to lack of tone in the uterine tissue. Further study of the six cases recorded as of anteflexion leads me, in the light of accumulated experience, to the conviction that at least

four of them should also have been classed as ovarian fibroses; in the remaining two the signs of ovarian disturbance were less marked, but some degree of change in these organs is probable. They were all young women, ranging in age from nineteen to thirty-one years; dysmenorrhœa was the chief symptom for which they sought relief; in the majority of cases menstruation had become painful after some years—two to four—of normal flow; but in two cases it was painful and irregular from the beginning. Endometritis was present in all. Neurasthenic manifestations were commonly marked, associated with pelvic discomfort and a tendency to multiform pains and aches in various parts of the body, and a general mental drift towards chronic invalidism. A fuller description and closer analysis of these nervous manifestations will be reserved for the section treating of the ovarian fibroses, with which condition further study of them has led me to associate them. A fairly typical picture of the physical and mental attitude of these patients is very briefly given in the following extract from a letter by a young woman, twenty-four years of age, reporting her condition at the expiration of one year after her leaving the hospital:

“It is a year last month since I came away. While I have been comparatively free from pain for several months, with any over-exertion whatever it shows an inclination to return, and it seems as if I cannot express how strangely tired and confused I feel so many times. It seems as if I do not feel well even when I call it that I am well. I have never been very strong, but until I had this uterine trouble I had always been fairly well.”

As regards the *treatment* of these cases, it has passed through three different phases; all were submitted to dilatation and curettage, and to the resulting effect upon the endometrium is undoubtedly due much of the relief which has commonly followed. In the earlier cases a wire intrauterine pessary was put in place, and retained for from two to three months. This, however, has not been used since 1889. In

addition, retrocession of the cervix, so as to favor a permanent straightening of the uterine canal, was produced by making a free transverse incision through the vaginal mucous membrane, at the anterior cervico-vaginal junction, and by drawing together the two outer angles of this incision, converting the transverse incision into a longitudinal suture line. This was abandoned in 1894, not but that the results had been fairly satisfactory, but because by this date a fuller appreciation of the etiology and pathology of these cases had been arrived at, and from this time the condition of ante-flexion disappears from the records as a distinct entity.

Fibromyomata of the Uterus.—Thirty-four women were admitted on account of fibromyomatous tumors of the uterus. In four of these cases no operative interference beyond a simple curettage was deemed called for.

Ablation of Tumor per Vaginam.—In five cases the tumor was a submucous growth that had become pedunculated and was partially extruded into the vagina. In these cases the presenting tumors were enucleated *per vaginam*, after such section of the cervix as was required in each case to give free access to their base. In two of these cases the protruding mass was in a sloughing, infected condition, and the patients were in a state of marked depression from septicæmia and loss of blood; one, a woman, fifty-one years of age, developed at once after operation a femoral phlebitis and thrombosis, but ultimately recovered after a prolonged illness of twelve weeks; the second, a woman, fifty years of age, was nearly moribund when admitted to the hospital, the vagina being distended with a cocoa-nut sized mass, gangrenous and offensive; her anæmia from previous long-continued hæmorrhage from this tumor was extreme, and the septicæmia from absorption of its septic fluids was profound. The tumor was removed without delay, but too late to prevent death from the pre-existing loss of blood and septic absorption.

Oöphorectomy was resorted to in the cases of two young married women, aged respectively twenty-seven and twenty-

eight years, who presented multiple myomatous nodules; in the one case developing into the broad ligament space at the corporo-cervical junction, and in the other developing from the posterior surface of the uterus, and filling the pelvic cavity. The immediate controlling indication for operation in the first case was uterine hæmorrhages; in the second case dystocia, the patient having been delivered with great difficulty seven months before on account of the obstruction to the outlet of the pelvis produced by the tumor; fearing the consequences should she again become pregnant, she applied for surgical help. Smooth recoveries followed in each instance. The later history of the first case is unknown; the second case has been repeatedly re-examined; now, at the end of two years, notable shrinking of the pelvic tumor is evident; the nervous and emotional disturbances common to the menopause have been quite marked.

Abdominal myomectomy was performed in two cases; in the one case, a woman forty years of age, a pedunculated subserous fibroid, of the size of a lemon, was attached to the fundus of the uterus. The disability produced by this small growth was surprisingly great, being out of all proportion to its size, due doubtless to the traction which it exerted upon the uterus, pulling it into lateral or retroflexion whenever she was upon her feet, and for two and a half years rendering her an invalid, on account of the resulting pelvic discomfort. Amputation of the pedicle and suture of the stump were followed by an uneventful convalescence.

In the second case, a woman, thirty-one years of age, was admitted nearly four months advanced in a first pregnancy, with the enlarged uterus forced out of the pelvis and recognizable as a soft tumor crowded over towards the right iliac region by a hard mass lying in the left iliac fossa, and displaced upward by a globular mass which was attached to its posterior surface, and filled up the cavity of the pelvis, where its outline was clearly definable by vaginal examination. Delivery of the child at term through the natural passages was clearly out of the question in her then condition; delivery at term by Cæsarean section would

leave her exposed to a repetition of the same dangers in subsequent pregnancies, although, to be sure, the possibility of a recurrence of that condition might be forestalled by removal of the ovaries. The evident pedunculation of the tumors suggested the possibility of their removal without disturbing the progress of the pregnancy, rather than of terminating the pregnancy by inducing an abortion, since this latter procedure certainly would sacrifice the life of the child and might not be free from danger to the life of the mother. The literature of the subject contains numerous examples of the successful issue of myomectomy in such cases (seven cures out of ten cases collated by Pozzi). This procedure was accordingly chosen. Upon exposure of the uterus the removal of the pedunculated mass lying in the left iliac region was quickly and satisfactorily accomplished, as was the case also with three other smaller and sessile growths which readily peeled out when the overlying serous membrane was divided. The largest mass filling the pelvic cavity was disengaged from that cavity with difficulty, but was finally delivered, and its thick, short pedicle, attaching it to the posterior inferior portion of the uterus, was made accessible by drawing the uterus forward and to the right. After ligating the pedicle the tumor was cut away, when it was found that the ligatures had not secured complete hæmostasis on account of the density of the pedicle tissue and the size of the venous sinuses which traversed it. Considerable difficulty was experienced in the application of supplementary suture ligatures on account of the vascularity of the uterine wall, but complete arrest of bleeding was finally apparently secured, and the abdomen was closed with the patient in fair condition, with a pulse-rate of 100. Five hours later she was found to have a pulse of 140, a temperature of 100.5° F., and to exhibit a corresponding general prostration. For forty-eight hours she hovered in this condition, with a rising pulse and temperature, and then died. Autopsy revealed eight ounces of blood in the pelvic cavity, the source of which was the stump of the pelvic tumor; the relaxation of the tissues after replacement *in situ*, and the increased blood-pressure incident to the change from the Trendelenburg position to the horizontal position, had permitted the slow but continuous concealed bleeding which had caused the death. There were no inflammatory exudates; there had been no symptoms of abortion.

Electrolysis, or the so-called method of Apostoli, was resorted to as the method of choice in the treatment of uterine myomata during the earlier portion of this decennial period, on account of the many positive claims as to the resolvent influence of suitable electric currents upon such growths, and the large mortality which had up to that time generally attended their removal by cutting operations. Four women were submitted to this treatment by myself. The record of these cases is as follows:

CASE I.—Aged forty years. Symmetrical median enlargement; upper margin midway between symphysis and umbilicus. *Symptoms*: Menorrhagia, neuralgic pains in legs, aching in left inguinal region; inability to stand for any length of time or to attend to household duties on account of sense of weight in pelvis and of abdominal pain and tenderness. *Treatment*: Galvanic current of sixty-five milliampères for fifteen minutes every third day. Five such applications made supplemented by one of 200 milliampères under ether. At the end of eight weeks returned to her home in a distant part of the State, her general discomfort having been much alleviated, but with little, if any, diminution in the size of the tumor. Further history unknown.

CASE II.—Aged forty-nine years. Symmetrical median tumor, upper margin reaching the level of the umbilicus, growth chiefly from the fundus and the anterior wall of the uterus. *Symptoms*: Menorrhagia, general debility, pelvic discomfort, copious muco-purulent discharge from uterine cavity. *Treatment*: Curettage, galvanic current of from seventy-five to 120 milliampères; number of times applied, fifteen. Result: Tumor shrunk in size about one-third; menorrhagia ceased, general health much improved. After ten weeks of treatment in the hospital she returned to her home in another State. After her return home her former symptoms gradually relapsed, and she repaired to a hospital in Philadelphia, where she was submitted to hysterectomy.

CASE III.—Aged forty-four years. Symmetrical median tumor, upper margin reaching within one inch of the level of the umbilicus; growth seated in the upper right wall of the uterus. *Symptoms*: Excessive and painful menstruation, con-

tinuous offensive muco-purulent discharge from the uterine cavity, marked anæmia, chronic nephritis. *Treatment*: Galvanic current of 100 milliampères were applied for ten minutes every other day, until eight applications had been made, by which time the endurance of the patient was exhausted, and a thrombosis of the right internal saphenous vein had been provoked. No evident effect upon the size of the tumor nor upon the local or general state resulted. This patient since leaving the hospital has continued under my personal observation; the growth gradually increased in size during the following two years, but has since remained stationary. Her general condition of invalidism, the losses of blood, and the local discomforts remained unchanged for six years; then during the last two years upon several occasions a menstrual period has been missed, and at other times the losses of blood have been notably less. She is now fifty-two years of age, and is still in expectation of the menopause. Her renal condition with cardiac complications has been such as to put out of the question any resort to operative relief.

CASE IV.—Aged thirty-four years. Upper margin of tumor extends nearly to the level of the umbilicus; it has developed from the posterior wall of the uterus, and its lower mass fills the pelvic cavity, causing a manifest protrusion downward of the posterior fornix of the vagina and crowding the cervix far upward behind the symphysis pubis. *Symptoms*: Painful and profuse menstruation, pelvic pain and tenderness, anæmia, and general prostration. *Treatment*: Nine applications of the galvanic current, in strength varying from fifty to seventy-five milliampères, were made during a period of twelve weeks; as it was impracticable to introduce an electrode into the cavity of the uterus, owing to the position of the cervix, the electrode was introduced at each application directly into the substance of the tumor through the vaginal wall where the latter was pushed forward by it; careful antiseptic precautions were employed in each instance. The hæmorrhages lessened, the pelvic pains disappeared, the general condition improved, but no change in the size of the tumor took place. Two applications, of 160 and 180 milliampères respectively, were then made, after the last of which she returned home. Six weeks later she was brought back to the hospital in a state of profound prostration, with the rigors and sweats indicative of abscess-formation. This was aggravated

after admission by a severe uterine hæmorrhage, which was controlled, but the resulting prostration added to the advancing septic intoxication began to threaten speedy dissolution; the presence of a septic focus in the uterine tumor was unquestionable, and its evacuation was imperative. Some temporary rallying having been secured by stimulants, a suprapubic incision was made and the tumor turned out, and after the application of a clamp to the cervix the uterus, with its tumor, was cut away. The entire procedure was accomplished within twenty minutes, but the shock of this procedure added to the pre-existing prostration overwhelmed the patient, who died within a few minutes after the removal of the tumor. A subsequent section of the tumor disclosed deep in its body a pus-cavity containing ten ounces of pus.

The results from electrolysis in five other cases in the service of my colleague, Dr. Fowler, during this same period, were equally unsatisfactory, and the conclusion was forced upon us that the method had not sufficient positive influence over the growth of these tumors to warrant its further use in their treatment, and it was accordingly abandoned.

Hysterectomy by abdominal section was done in the remaining seventeen cases of the series. Fourteen of these patients recovered, three died. Of the deaths two were due to septic peritonitis. They represent imperfections in the aseptic technique, which more favorable circumstances and more rigid watchfulness should largely prevent in future. One was due to loss of blood and shock unavoidably inherent in the conditions of the case.

The patient was a woman, thirty-two years of age, who for six years had been conscious of the presence in her pelvis of a gradually increasing tumor, which more recently had been growing with greater rapidity until it had reached the level of the umbilicus and had begun to provoke troublesome pressure symptoms with rectum and bladder. Abdominal section revealed a soft, very vascular growth with extensive adhesions to bowels, omentum, bladder, and parietes, the adhesions marked by the development within them of innumerable large blood-vessels. Systematic separation of adhesions, with ligatures to control

hæmorrhage. Extensive areas of capillary oozing, not manageable by ligatures, treated by compression. Supravaginal amputation with fixation of stump in abdominal wound. Iodoform tampon in pelvis with drainage-tube. Profound depression from acute anæmia. Temporary improvement from intravenous infusion of forty ounces of saline solution. Later, relapse and death from combined shock and anæmia.

In none of these cases would the growths be classed as other than of moderate size, none of them having risen into the abdomen much above the level of the umbilicus. (See Plate I, A, and Plate II.) The absence of colossal tumors from the series speaks at once for the generalization of knowledge which marks the present day as to the possibilities of surgical relief in such cases, and demonstrates the readiness with which patients now apply for relief as soon as troublesome symptoms develop. Most of these patients came to the hospital already fully aware of their condition, and with the express purpose of having their tumor removed. The degree and character of the disability varied much, depending upon (a) the direction of development of the growth,—the submucous tumors provoking excessive hæmorrhages and endometritis; (b) the relation of the growth to other pelvic organs,—the tumors developing into the broad ligament from the cervico-corporeal region and those from the lower posterior surface of the body, giving rise early to marked compression symptoms upon bladder and rectum and upon the pelvic nerves; (c) accidental complications,—inflammation, pregnancy, the coincident presence of ovarian growths, the angiomatous or carcinomatous degenerations, appendicitis, each having been present in some of the cases of this limited series; (d) the personal equation of the patient, great differences existing as to the way in which different patients react to the same local condition, depending upon the temperament of the individual.

In determining the propriety of resorting to hysterectomy for the relief of these patients, two points have been especially considered: (1) *The risks of the operation proposed.*



PLATE I.—Varying forms of abdominal enlargement in different classes of uterine and ovarian tumors. A, fibromyoma of uterus; B, adenocarcinoma of ovary; C, cystoma of ovary.



PLATE II.—Uterus deformed by multiple fibromyomata; pedunculated subserous, corporeal, and cervical mural tumors. From photograph of specimen after removal by abdominal hysterectomy; presented as an average specimen of cases submitted to operation.

Increasing knowledge and experience in the operative details and in the means of preventing septic sequelæ have reduced the unavoidable mortality of this operation to a very small figure. This unavoidable mortality is at its minimum if the operation is done while the growth is still moderate in size and the general powers of the patient have not been exhausted by pain or losses of blood, or have not been compromised by degenerations in other organs; this minimum of mortality may be secured with far greater certainty amid the conditions of a properly organized hospital operating-room. The 17.5 per cent. mortality which has attended this particular series is far higher than properly belongs to the operation. It is not greater, however, than reasonably attaches to the early essays of operators in this field; greater importance will attach to the rate of mortality which shall attend the series which may be reported at the end of a second period of ten years. The writer agrees fully with those surgeons who teach that the rate of mortality properly belonging to hysterectomy for fibromyomata should not exceed 10 per cent., and may reasonably be expected to be brought as low as 5 per cent. When the risks to life of a procedure have become reduced to the small degree stated, the surgeon is unquestionably justified in recommending it, and, whenever the determination is left to his own judgment, in resorting to it in any case in which the position, size, or complications of a uterine growth have begun to induce noticeable pain or disability or to provoke serious losses of blood that cannot be certainly controlled by a less serious procedure, or in which the mental distress of the patient is such as to markedly detract from the happiness of life. The risks attending hysterectomy under the best of conditions are greater than those which attend oöphorectomy, but the thorough removal of diseased tissue, the certain absolute relief from the symptoms incident to the growth, and the prevention of all later complications from degenerative changes, all of which follow hysterectomy, more than compensate for the additional risk in the average case, and dictate the reser-

vation of oöphorectomy to those cases in which for any reason it is evident that extra hazards would attend the more radical operation.

(2) *The social condition and the relations to professional care* which individual cases may present have an important influence in determining present resort to radical operative interference. The question with women who apply to a hospital for relief from uterine myomata is, as a rule, whether they shall continue in a life of invalidism for years until the regressive changes of the menopause shall possibly bring relief, with many possibilities of suffering and of death meanwhile from diseases of other organs indirectly contributed to by the uterine disease, or shall take the risks of present operation. These women cannot afford to be invalids; they must work for their own support and for the care of those dependent upon them; they call for present relief whatever the risks may be! Again, many of these women come from distant country and village homes to secure in a metropolitan hospital help which it is impossible for them to command in their own homes. The surgical oversight needed to secure them as far as possible against the disturbances and accidents incident to their state if they are not operated upon they cannot have. For such women the degree of risk attending a hysterectomy is much outweighed by the necessities for radical relief which their conditions produce.

For these reasons hysterectomy has been resorted to in so large a proportion of the cases of myoma which have been treated in this institution. In all cases, except the ones in which there was a distinct tendency for the growth to protrude into the vagina, the organ and its tumor masses were taken away through an incision in the abdominal wall. The proposition to extend vaginal methods of attack to the removal of uterine tumors of considerable size has not commended itself to my judgment, although the possibility of the successful application of this method has been demonstrated by certain operators; yet the limitations to exact and careful work are so manifest, the ability to recognize and deal with

important complications is so greatly diminished, and the danger of injuring adjacent organs is so much increased, when the efforts at removal are limited to the vaginal route, that the proposition has seemed to be in direct contravention of sound surgical principles. Experience has demonstrated to me, however, that much advantage can be derived from a combination of the vaginal and abdominal methods of attack, the work being begun through the vagina, including curettage and tamponade of the cervical canal, the full detachment of the vagina from the uterus, the separation of the bladder, and the opening of the posterior cul-de-sac. After the ligation of all bleeding vessels, the spaces that have been opened up have been packed with iodoform gauze, and the vagina distended with a tampon. The further steps have been conducted through an abdominal incision, which has been made sufficiently liberal to give free access and unhindered vision to all parts of the operative field. In most cases the Trendelenburg position has facilitated much the progress of the operation. After the separation from adhesions and delivery of the tumor mass, the ovarian vessels are first ligated by a mass ligature applied to the upper part of the broad ligament, outside the ovary, then the round ligament is ligated, and then the tissue between the two ligatures is secured in a third ligature; a stout clamp is then placed on the broad ligament cut previously made; by opening up the broad ligament divided down to its point. When this has been done on both sides the uterus has thereby been freed from its lateral attachments, and may be more readily drawn out of the pelvis so as to make its deeper connections more accessible. The bladder is now identified, and the peritoneum, where it is reflected from the bladder to the uterus, is incised by a transverse cut, which extends on either side to the broad ligament cut previously made; by opening up the lateral connective-tissue spaces thus made accessible the uterine vessels are exposed and are readily isolated and ligated, first on one side and then on the other. The anterior wound-cavity, separating the bladder from the cervix, made

prominent by its distention with gauze, is now opened readily, and, guided by a finger inserted into it, the final complete cutting out of the cervix from its pelvic attachments is quickly accomplished. Any bleeding vessels having been ligated, a fold of iodoform gauze is laid in the vagina with its inner end resting between the wound surfaces left by the excision of the uterus; the peritoneum is then sutured in a transverse line from one broad ligament stump to the other, covering in all raw surfaces and shutting off the vaginal opening. The suture of the abdominal wound completes the operation. The primary vaginal gauze drain, as a rule, is removed on the fourth day; a lighter one, barely reaching to the lips of the vaginal section, is put in its place, to be removed permanently at the end of four days more. Uncomplicated healing of the excision wound has been the rule, and a firm pelvic floor has in all cases resulted. Catgut has been used for all ligatures and sutures, except in some of the earlier cases in which silk was used for the broad ligament ligatures, the ends being left long and carried out through the vagina, to come away during the second week. An increasing confidence in the reliability of catgut soon caused me to substitute it entirely for the silk with results that have been entirely satisfactory.

The cases that have presented the most difficulties have been those in which there have been present masses springing from the cervix or low down in the body, and developing outward between the layers of the broad ligament. The enucleation of such growths is not so difficult, but the relations of the ureters to them is so uncertain that considerable danger of wounding a ureter, or of including it in a mass ligature applied to a bleeding surface, is always to be guarded against in the course of the work. Such an accident occurred in the following case:

A woman, forty-nine years of age, was admitted with a large myoma springing from the posterior cervico-corporeal region, filling the pelvis and compressing rectum and urethra so that defecation was difficult and voluntary urination was impossible.

The condition is shown in Fig. 6. In the course of the enucleation of the tumor the right ureter was exposed for about one inch and a half of its course deep in the pelvis. To a bleeding point on the wall of the ureter it was necessary to apply a ligature, and a mass ligature was also applied to the tissue in its close vicinity. For these ligatures silk was used, the ends being carried down into the vagina. The case progressed without special complication until the end of the second week, when the clump of ligatures from the right side came away, bringing with it quite

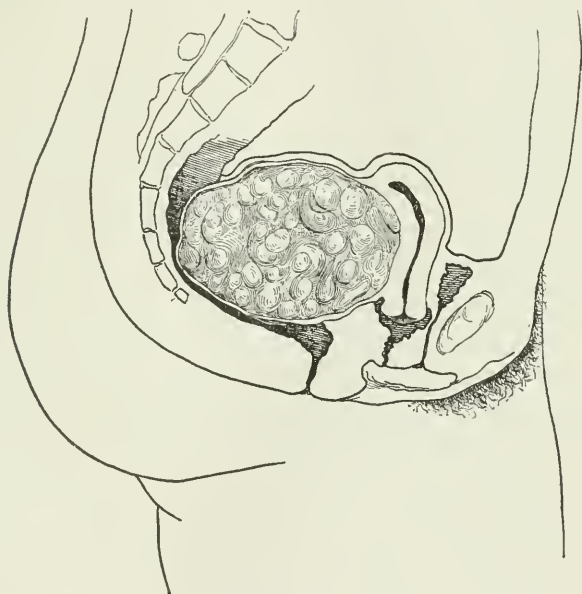


FIG. 6.—Deep-lying fibromyoma of posterior wall of uterus.

a mass of necrotic tissue. From this time the escape of some urine *per vaginam* became continuous; careful measurements of the urine voided by the urethra showed that fully one-half of the normal amount was missing, and cystoscopic examination of the interior of the bladder showed that no urine was entering it by the right ureteral opening. The escape of urine by the uretero-vaginal fistula continued to be free for six months; then there developed an attack of retention and distention of the ureter and pelvis of the kidney from obstruction due to cicatricial contraction about the outlet of the ureter into the vagina; this was

spontaneously relieved after some hours of great pain, but recurred again and again during the following six weeks. Examination indicated also the existence of infective ureteropyelitis on the injured side, but with a healthy condition of the kidney and ureter of the opposite side. Extirpation of the diseased kidney was accordingly then done, the removal being effected through an anterior transperitoneal incision. A smooth convalescence followed. The patient has been frequently seen during the five years which have elapsed since this final operation, and she has remained in robust health.

Hysterectomy for Myofibromata complicated by Pregnancy.

—In two instances women who had been carrying for some years uterine tumors applied for relief on account of recent rapid increase in size of the tumors, which had now become sources of discomfort and were giving rise to apprehension as to the future; in one there was a marked tumor-development between the layers of the broad ligament blocking up the pelvis and lifting up a fluctuating nodular mass into the hypogastrium. No suspicion of pregnancy was awakened; the tumor was enucleated until the cervix was isolated and a clamp applied to it, beyond which the whole uterine mass was cut away. After its removal, upon opening the largest fluctuating node, it was found to contain a macerated fœtus of six months' development. The tumor, the opened uterine cavity with attached placenta and fœtus are shown in Plate III. The patient made a smooth recovery and has since continued in good health.

In the second case there were multiple growths in the fundus and body of the uterus, the largest of which projected from the fundus and reached to the level of the umbilicus, being slightly constricted at its base. The removal of the entire organ by the combined vaginal and abdominal method already described presented no difficulties, and the subsequent convalescence was uninterrupted. On opening the uterus, after its removal, there was found in its cavity a fœtus of three months' development.

(TO BE CONTINUED.)



PLATE III.—Fibromyoma of uterus complicated with pregnancy; hysterectomy during the sixth month of the pregnancy. Photograph of specimen after removal, showing tumor mass and placenta *in situ*, with attached foetus.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, November 24, 1897.

The President, ANDREW J. McCOSH, M.D., in the Chair.

THE RESULT OF AN OPERATION FOR THE CURE OF AN INTESTINAL FISTULA.

DR. ROBERT F. WEIR presented a woman, thirty-four years old, who in 1894 had a series of troubles in the abdominal cavity, which determined the surgeon who then attended her to perform an exploratory operation. He told her afterwards that the appendix had been removed. The following year the same surgeon operated on the woman again, removing the uterus and its appendages. Following the second operation there was a vaginal fistula, through which the fæces discharged quite freely. For the relief of this fistula four operations were performed. At the second one, which was done in July, 1895, the abdomen was opened, two inches of the small intestines were resected, and the ends approximated with Murphy's button. The button remained *in situ* for four weeks, and then, as it gave rise to obstructive symptoms, it was removed through the abdominal wound, which from that time remained open as a fæcal fistula.

The patient came under Dr. Weir's observation on November 21, 1895. She then had two small fistulæ, one at the bottom of the abdominal opening, discharging fæcal masses characteristic of the lower end of the small intestine, and the other communicating with the top of the vagina. The abdominal wound was enlarged to four inches along-side the original scar, and, after some little difficulty in separating the adhesions, the damaged small intestine was found deep behind the bladder; in this two openings were found. They were about three-quarters of an inch apart; one communicated with the abdominal

fistula, which latter was dissected out, and the other with an abscess cavity, which, through a smaller opening, communicated with the vagina. The intestinal fistula was closed by a double row of Lembert sutures, and the opening into the vagina was enlarged, the abscess cavity scraped and packed with iodoform gauze. No further fecal discharge occurred from the abdominal wound. Six weeks later the abdominal fistula had closed completely, but there was still slight leakage occasionally through the vaginal opening. In the course of four months, however, this opening also closed, and has remained well up to the present time. A small hernia has occurred from the repeated openings along the line of the abdominal cicatrix.

NEPHRECTOMY FOR SARCOMA OF THE KIDNEY WITHOUT RECURRENCE AFTER FIVE YEARS.

DR. ROBERT ABBE presented a girl, aged six years, who had been operated on by him for sarcoma of the right kidney on November 20, 1892. Nephrectomy was performed. At the time of operating the child weighed fifteen pounds and the tumor seven and a half pounds. The growth proved to be a rhabdomyosarcoma, containing striated muscular tissue, mingled with round- and spindle-celled sarcoma.

The patient appears in perfect health, and has a rosy complexion. There is a firm, sound scar and no suspicion of recurrence, the child having remained uninterruptedly well since operation. The case had previously been seen by the society and a full report of it was published in the *ANNALS OF SURGERY* for January, 1894.

RECURRENT DISLOCATION OF THE SHOULDER.

DR. L. A. STIMSON presented a man, twenty-one years old, who, two years before, had sustained a traumatic dislocation of the left shoulder. During the eighteen months subsequent to this the joint was dislocated by slight movements fourteen times, the last one taking place the night before an operation for the relief of the condition was performed. The joint was exposed by an incision along the anterior margin of the deltoid and another running outward from the centre of the first; the an-

terior portion of the deltoid was detached from the acromion and reflected. The joint was then opened to ascertain the condition of the glenoid fossa, and this being found uninjured the opening was closed and the capsule narrowed about an inch in front by making a fold in it, the fold being held by two or three silk sutures, according to the plan suggested by Ricard and practised also in habitual dislocation of the patella. The wound healed without any complication, and the patient has thus far had no recurrence of his trouble, and is able to use the joint as freely as the other.

TRAUMATIC DISLOCATION OF THE SEMILUNAR BONE OF THE RIGHT WRIST.

DR. STIMSON presented a stevedore who had received the injury by the fall of a heavy box against the palm of his hand, the wrist being in full dorsal flexion, while the back of the arm (the elbow flexed at a right angle) rested against a wall. Apparently the immediate cause was forced dorsal flexion of the wrist. There was no injury to the soft tissues, but immediately beneath the skin, on the anterior aspect of the wrist, a small, movable, hard body was felt which, on removal the next day, proved to be the semilunar bone.

It was found lying on the ulnar side of the median nerve and main flexor tendons, and still retained its attachment to the radius. This had to be severed before it could be removed. The wound healed rapidly and the result promises to be satisfactory. In connection with this case, Dr. Stimson showed two X-ray photographs of the dislocation taken previous to the operation.

FRACTURE OF THE HEAD AND NECK OF THE RADIUS.

DR. STIMSON presented a man who had sustained a fall of about twelve feet, striking the ground with his right arm under him. On examination it was found that the head of the radius moved with the shaft; the parts were considerably swollen, and there was marked lateral mobility of the elbow-joint. Dr. Stimson regarded the case as one of fracture of part of the external condyle or of the capitulum, and the arm was put in a dressing. When this was taken off, about three weeks later, all motion of the joint was abolished and the head of the radius was more

prominent externally than it should be, although it still moved with the shaft. An incision was thereupon made over the outer aspect of the elbow and the joint exposed. A fragment comprising two-thirds of the head of the radius was found with its articular surface directed outward and backward, and examination showed that it had reunited with the shaft. It and the remaining portion of the head were then removed by cutting through the neck with bone forceps. Repair of the fracture was so far advanced at the time that Dr. Stimson was unable to say whether or not the inner portion of the head had also been broken from the shaft. So far as could be seen through the wound the coronoid process of the ulna was uninjured.

IRREDUCIBLE UNILATERAL DISLOCATION OF THE TEMPORO-MAXILLARY JOINT.

DR. STIMSON presented a man who had been admitted to the New York Hospital about a month previous with a dislocation of the left temporo-maxillary joint, caused two weeks previously by yawning. There was a large ulceration on the inside of the cheek due to the pressure of the tissues against the teeth on that side. The man was put under ether and an attempt was made to reduce the dislocation. This failed, evidently on account of some obstacle within the glenoid fossa, for the molar teeth could be separated so widely that obstructing contact between the condyle and eminentia articularis could be excluded. The joint was thereupon opened, and the cause of the difficulty was found to be the meniscus, which was detached from the condyle and occupied the glenoid fossa. This was dissected out and the reduction made without further difficulty.

Dr. Stimson said that such a condition has been reported in connection with cases of habitual dislocation, but he had never before heard of it as an obstacle to reduction in an acute case.

THREE CASES OF NEPHROTOMY.

DR. R. F. WEIR presented a young woman upon whom nephrotomy had been performed for an abscess of the right kidney, which discharged about ten ounces of pus. No calculus was found. The patient made a good recovery, although there was a sinus after the operation, which remained open for some time, and was finally closed by means of injections of tincture

of iodine. About eighteen months after the operation the patient developed a tubercular inflammation of the right ankle, which persisted for two years. At the present time she is enjoying excellent health, and illustrates a cure by nephrotomy of a tubercular kidney.

Dr. Weir presented a second patient, a young woman who was operated on in 1888 for renal symptoms, which dated back about sixteen months previous to the operation, and were associated with a cystitis. The affected kidney was exposed by the usual lumbar incision and incised. It was found to be invaded by numerous abscesses, separate from each other, which contained a large quantity of pus; this was evacuated and the organ drained. There was no evidence of renal stone, and the origin of her trouble could not be ascertained. The patient began to improve immediately after the operation, and has remained well ever since. There is no evidence of a hernia at the site of the incision.

A third case was shown by Dr. Weir, a woman upon whom he had operated for a large abscess of the kidney, which extended down to the anterior superior spine, and contained over a quart of pus. The wound healed promptly. There was no stone and no suspicion of tuberculosis.

Dr. Weir said that the ordinary method of puncturing the kidney for the detection of stone is often unsatisfactory; a more reliable method is to open the kidney and examine it with the finger or sound, and even then a stone may remain undetected. It is not always easy to thoroughly explore the pelvis and ureter. For the latter purpose the speaker recommended the use of a flexible metallic probe, which should be from eighteen to twenty-one inches long, as not only is the ureter longer than is generally described but it stretches readily under pressure. In difficult cases where the ureteral orifice is not promptly accessible to the probe it will be found of service to use an open-ended catheter as a guide and through this to conduct the flexible probe.

The second and third cases were examples of non-tubercular abscess and of probable vesical origin.

HYDRONEPHROSIS.

DR. WEIR presented a young man who had been the subject of a hydronephrotic kidney of huge size, the tumor extend-

ing below the anterior superior spine. It was incised and about twenty-four ounces of fluid evacuated. This fluid was of a low specific gravity and contained a trace of albumen, being similar to the fluid usually found in such retentions. At a later operation the hydronephrotic sac, which contained only a small amount of kidney tissue, was removed.

The patient made a good recovery. There is at the present time a slight hernial protrusion in the line of the cicatrix. Dr. Weir believed that anastomotic operations, as practised by Fenger, of Chicago, should be reserved for the slighter or pelvic hydronephroses, and that they should not be applied to mere enormous destruction where not only is the kidney tissue slight but what remains is in a degenerated condition.

Dr. Weir also showed a patient from whose kidney he had removed a large stone, together with over thirty-nine small ones.

TUBERCULOSIS OF THE KIDNEY AND BLADDER;
RESECTION OF ONE-HALF THE BLADDER;
NEPHROTOMY; SUBSEQUENT NE-
PHRECTOMY.

DR. WEIR presented a man, forty-four years old, who had suffered for several years from cystitis of a severe type. His urine frequently contained blood and pus. With the aid of the cystoscope a flat, broad tumor on the posterior upper wall of the bladder was made out. Suprapubic cystotomy was thereupon performed. The tumor on the bladder wall was soft and bled very readily. It was of tubercular nature. The posterior and superior bladder walls were involved, and it was found necessary to remove nearly one-half the organ. The peritoneum was first peeled off from the posterior and superior surfaces, then the organ itself was resected down to the prostate, and between the vasa deferentia and superiorly as far forward as the symphysis pubis, and closed by sutures, which were passed through the entire thickness of the bladder walls. On the upper surface an opening was left for drainage.

In the course of the operation it was observed that the right kidney was enlarged, and on aspiration pus was withdrawn, and then a nephrotomy was due. Temporary improvement; but when he left the hospital both wounds apparently were involved by tuberculosis. He did not progress very favorably, and three

months later it was finally decided to remove the right kidney. This was done, with sundry scrapings of the hypogastric fistula, on November 12, 1896. His condition at the time was so desperate that it was thought he could hardly survive the operation. Since then, however, he has improved very much, and states that he has gained sixty pounds in weight and is enjoying excellent health, and has never been so stout and hearty. His urine, which was formerly loaded with tubercle bacilli, is now entirely free from them. Both wounds have soundly healed. He can hold from two to three ounces of urine.

DR. STIMSON remarked, as to the recognition of stone in the kidney, that on one occasion he was able to detect the stone by distinct crepitus elicited by bimanual palpation. The kidney was opened, and a stone about as large as a kidney-bean was found. It was singular, he thought, that this grating sensation was elicited in view of the fact that only one stone was present.

DR. F. W. MURRAY, with reference to Dr. Weir's case of tuberculosis of the bladder and kidney, said the man had been under his care for several weeks after the first operation, while Dr. Weir was absent from the city. After the operation on the bladder the organ was able to hold about two ounces of urine. In August, 1896, there was an exacerbation of the renal symptoms and the man's condition was extremely critical, his temperature daily going up to 104.5° F. After Dr. Weir's return the kidney was removed, and Dr. Murray said he was surprised to see the wonderful change in the patient since that time.

DR. WILLY MEYER said he was especially interested in Dr. Weir's last case, where so excellent a result followed the removal of such a large portion of the tuberculous bladder. The speaker said he wished to call the attention of the members once more to the value of the cystoscope in the diagnosis of a descending tuberculous process of the urinary tract. In a number of cases he has been able to accurately locate the source of the trouble by means of this instrument.

Dr. Meyer said that in his last five cases of nephrectomy he clamped the renal vessels instead of applying a ligature, and allowed the clamp to remain *in situ* for twenty-four to forty-eight hours. After this interval there was no possibility of hæmorrhage. The advantages of this method over tying are the rapidity with which it can be done, its simplicity, and the more rapid

healing which follows it, the latter on account of the absence of a slowly necrosing pedicle. The surface of the clamp's branches must be grooved.

DR. FREDERICK KAMMERER said that in several cases of multiple kidney abscesses coming under his observation he had found that nephrotomy alone did not effect a cure, although the pus-cavities had been thoroughly broken up and ample drainage established. Nephrectomy finally became necessary.

Dr. Kammerer said that Dr. Weir's last case illustrated the power of the bladder to resume its normal size when reduced considerably by operative interference. In one case where he had operated for cancer of the bladder almost one-half of the organ was removed. A year later the patient showed no recurrence of the disease, and the bladder had become so much dilated that it easily held eight ounces of urine.

DR. WEIR said he had seen Kümmel, of Hamburg, incise and explore the kidney with very little hæmorrhage by the following method: The organ was lifted up to the very edge of the wound and then he slipped his fingers underneath it, so that the pedicle came between the ring and middle ones. He then compressed the artery and vein between these two fingers, and made his incision while the kidney was resting on the palm of his hand.

THE INFLUENCE OF TRAUMATISM ON THE DEVELOPMENT OF SARCOMA, WITH A REPORT OF FORTY CASES.

DR. W. B. COLEY read a paper with the above title, for which see page 259.

MULTIPLE NEUROMA OF THE CERVICAL SYMPATHETIC.

DR. ROBERT ABBE presented a specimen, and gave the history of the case, which will be published in detail, with remarks, in the ANNALS OF SURGERY for April.

SARCOMA OF THE FIBULA.

DR. W. B. COLEY exhibited a specimen of spindle-celled sarcoma of the fibula. The patient from whom it had been removed was a woman, fifty-two years old. The disease was first

noticed in 1892 and developed slowly. Amputation of the thigh was performed at the Post-Graduate Hospital in November, 1895. The patient developed symptoms of long involvement early in 1897, and died in the early part of November, 1897.

Dr. Coley also showed a recent specimen of round-celled sarcoma of the upper end of the tibia. This patient, a man aged thirty years, had been treated with the toxins of erysipelas for three weeks without benefit, after which time he amputated the thigh just above the condyles. In the latter case the sarcoma developed soon after an injury.

A FIBROCARCINOMA OF THE HEAD OF THE PANCREAS.

DR. GEORGE WOOLSEY related the following case: The patient was a man, thirty-two years of age, a German, and a farmer by occupation. He was admitted into Bellevue Hospital on October 28, 1896. His family history was negative. Eight years ago he had an attack of chills and fever. His present illness, which was of about a month's duration, consisted of occasional attacks of vomiting and increasing jaundice. There was also itching of the skin and at times there was some pain on the right side, in the region of the liver. His stools were whitish in color; the urine was red and dark. He had lost over thirty pounds in weight. There was no record as to sugar in the urine or fat in the stools.

His condition was not relieved by medical treatment. On the contrary, he became worse. A tumor was felt in the region of the gall-bladder, from which a greenish fluid, containing bile, was withdrawn with the hypodermic needle.

The patient was transferred to the Surgical Division and operated on December 5, 1896. An L-shaped incision was made and about twelve ounces of greenish fluid removed from the gall-bladder. There was no excessive hæmorrhage, as oftentimes occurs in cases of extreme jaundice. No stone could be felt in the gall-bladder, or in the dilated cystic, hepatic, and common bile-ducts. There was a hard mass felt posteriorly, internal to the arch of the duodenum, which proved to be the enlarged and hardened head of the pancreas. This was exposed, but as removal was not feasible or justifiable, owing to the inclusion of the portal vein and inferior vena cava, a cholecystenterostomy

with the duodenum was done by the use of the Murphy button. Drainage was instituted for thirty-six hours by iodoform gauze within a rubber tissue roll. The button came away on the ninth day.

Thirteen days after the operation fluid came away through the opening where the drainage-tube had been, after this opening had apparently closed. This proved to be pancreatic juice and caused considerable excoriation of the skin.

The patient died on January 16, 1897, of gradual exhaustion with emaciation.

The specimen, which was shown by Dr. Woolsey, presents a hard mass corresponding to the head of the pancreas, in which the common bile-duct, followed from above and below, is completely occluded for the distance of one to one and a half centimetres. Above this obstruction the common bile-duct is greatly distended, and the distention extends to the biliary ducts of the liver, where it is still very evident in the hardened specimen. The opening of the cholecystenterostomy shows no evidence of contraction.

DEATH DURING ANÆSTHESIA RESULTING FROM THE ENTRANCE OF FOOD INTO THE LARYNX AND TRACHEA.

DR. C. K. BRIDGON reported this case and showed the post-mortem specimen. The patient was a boy, six years old, who was brought to the Presbyterian Hospital in an ambulance, with the history of having been run over by a cable-car. His right ankle was badly crushed, to control the bleeding from which a tourniquet had been used. No internal injuries were made out; the pulse was about 100, good and strong. There was no vomiting. It was deemed advisable to wait for two hours before amputating, so that the patient could digest his dinner, which he had had about an hour before his admission.

Three and one-half hours after the ingestion of his dinner ether was administered, and the leg amputated at about its middle. The patient stood the operation well, and on leaving the table had a good, strong pulse of about 110. He had not vomited up to this time, but while going up in the elevator to the ward he vomited about two drachms of a material which resembled blood. Shortly after he was placed in bed, and before

he had completely come out of the anæsthetic, he had a sudden attack of vomiting and stopped breathing. This was quickly followed by a disappearance of the pulse. There was no vomited matter nor mucus found obstructing the pharynx.

An autopsy, made on the following day, showed that the larynx was blocked up by a mass of spinach-green material, which extended down the trachea and into the bronchi, the right bronchus being blocked more than the left.

As the pharynx was free from all obstruction, it is probable that the vomited matter was sucked into the larynx immediately after its exit from the œsophagus.

TRANSACTIONS OF THE SECTION ON GENERAL SURGERY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Stated Meeting, December 10, 1897.

The President, W. W. KEEN, M.D., in the Chair.

A NEW OPERATION FOR URANISCOPLASTY.

DR. RANDOLPH FARIES described an operation for uraniscoplasty, saying that it had suggested itself to him while observing an operation for rhinoplasty; the only practical difference being that in the operation for the former it is not necessary to twist the flap as is done in rhinoplasty. The mucous membrane on the margin of the fissure of the palate, on the opposite side to that of the flap, about to be described, is first dissected off. The length and breadth of the fissure in the hard palate is measured in centimetres in order to obtain a more accurate result than if inches were used. After recording these measurements the operator should cut an artificial flap from a piece of aseptic muslin or linen, measuring its breadth and length, so that it will correspond with those already taken. The artificial flap is then inserted into the fissure to ascertain whether it fits properly; if it does not, it should be trimmed until it does, allowing a little for the contraction of the tissue. The surgeon now places this flap in the mouth on the mucous membrane covering the palate process of the superior maxillary and also that covering the palate bone, selecting the right or left side as he chooses. The first incision is made parallel or nearly parallel with the horizontal plate of the palate bone, being carried from the posterior edge of the fissure to the posterior palatine groove, exercising care to keep in front of the posterior palatine foramen to avoid the blood-vessel which passes through it. The second incision is made along the margin of the fissure, leaving it shortly before reaching the anterior palatine fossa. The third incision is carried

from behind forward along the alveolar margin of the mucous membrane. The flap, thus begun, is then dissected up from behind forward, taking or leaving the periosteum as the operator desires; the dissection being carried forward to a point midway between the two incisors, keeping behind the incisive foramen. The loose flap is now placed in the fissure, the opposite side having been denuded; the sutures are introduced from behind forward: three or four being necessary on each side. Silver wire is used, clamped with shot, and the operation is finished. The sutures are left from four to eight days. If necessary the mouth may be sprayed with listerine, boracic acid solution, ten grains to the ounce of distilled water, or peroxide of hydrogen in the proportion of one to three of distilled water. The number of times the spray should be used must be regulated by the condition of the wound in each case.

In the foregoing operation it is not necessary to incise the tensor palati.

DR. JOHN B. ROBERTS questioned whether the blood-supply in the flap described by Dr. Faries would be sufficient to maintain its nutrition, particularly as the supply coming from the periosteum and from a posterior direction was entirely cut off by the incision. Dr. Roberts performs the operation on the soft palate first, leaving the hard palate for a subsequent time. In closing the defect in the hard palate he employs flaps consisting of mucous membrane and periosteum from either side, which are displaced towards the centre and united by sutures in the middle line.

DR. W. W. KEEN feared that such a long flap having but a slender pedicle would slough. His experience has been that the width of the cleft in the palate is usually greater than the distance from either margin of the cleft to the teeth on the corresponding side. The vitality of the bone would undoubtedly be preserved by the nasal mucous membrane, so that there is little or no danger of necrosis from including periosteum in the buccal flaps.

CORRECTION OF PES VALGUS.

DR. H. AUGUSTUS WILSON demonstrated a new method, which he had devised, of forcibly correcting flat-feet, by the use of an apparatus which quickly restored the broken-down arches.

The method which had been employed consisted of first

subjecting the foot to superheated air, usually about 300° to 350° F., for an hour, in one of the forms of appliances now provided for that purpose. Immediately following this the new apparatus was applied, so that the plantar pressure elevated the depressed tarsal bones, and counter-pressure pulled down the metatarsal bones in front, and the os calcis behind.

The application could be carried to almost any extent by the use of the rapid acting adjusting screw, but ordinarily enough was accomplished by carrying the pressure to the point of endurance,—anæsthesia never having been found necessary.

Plaster of Paris was employed to maintain correction, which was changed every four or five days, to be reapplied in the new position. After four to six weeks it was usually found that the foot had become pliable and more easily corrected by hand. At this point the patient was carefully instructed in the gymnastic development of every intrinsic muscle of the foot, so that the voluntary efforts made correction and finally maintained the improved functional condition.

Occasionally some form of elastic arch supporter was employed temporarily during the gymnastic portion of the treatment, to enable the patient to walk without tending to flatten the arch.

DR. KEEN remarked that as flat-foot is an abnormality of the bones of the arch, he did not understand how one application or a few briefly repeated applications of the apparatus shown by Dr. Wilson would effect a cure. The observation that the necessary force required to correct the deformity caused great pain under ordinary circumstances and comparatively little or no pain after the foot had been treated in the hot-air apparatus to 300° F. or more, Dr. Keen thought was most interesting.

DR. HORWITZ testified to the value of the treatment described by Dr. Wilson. He had subjected some twelve cases to this method of treatment, with the most satisfactory results. He referred to a case of flat-foot complicated by very large and hard corn on the ball of the foot, in which he advised the spring support for the arch referred to by Dr. Wilson, with result that the corn soon disappeared and the patient was relieved. Another case of flat-foot, complicated by gonorrhœal rheumatism of several months' standing, was almost cured by two weeks' treatment in Dr. Wilson's department at the Jefferson Hospital.

DR. WILSON stated that it is his custom to "bake" the foot from half an hour to an hour, after which he overcorrects the deformity, when in bad cases a plaster-of-Paris bandage is applied to the foot, in the overcorrected position, and allowed to remain for a few days. The speaker believed that Ellis has done the best work in the line of gymnastic correction of flat-foot. The latter does not use supports of any kind, but relies solely on gymnastic development of the feet. It is advised that the shoe be laid aside for a time in order to fully develop the foot. Dr. Wilson was in the habit of occasionally employing a temporary support while the development is being carried out. He objects to all forms of support in the average case except as a temporary expedient. In some instances a support becomes necessary on account of the failure to secure the active and intelligent co-operation of the patient. In these cases he prefers the spring brace made by A. Gustaf Gefoert.

OPERATION FOR SADDLE-NOSE, WITH INSERTION OF GOLD PLATE WITHOUT EXTERNAL INCISION.

DR. W. JOSEPH HEARN reported the case of a young man, aged twenty years, whom he had operated upon for the relief of the deformity commonly called saddle-nose.

At the age of six the patient, while running, fell, striking the bridge of his nose on the sharp edge of the sill of a low window. He subsequently suffered much pain. There was great ecchymosis and swelling, the latter so marked that he was not able to open his eyes for six weeks. The patient meanwhile—so he states—had cerebral meningitis, and his life was despaired of. When the tumid condition began to decrease, pieces of bone, perhaps the nasal bones, were removed by the physician in charge. Within a few months he regained good health, but as a result of the injury the nose was then and remained much deformed.

The amount of deformity is well shown by the accompanying figures from a photograph. It was very marked, and the depression of the bridge of nose extended through the entire length of the nasal bones, and had caused so much retraction of tip of nose that in looking at the patient one looked directly into the anterior nares, they being almost vertical.

The case presented many difficulties in the way of restoring a natural appearance without any evidence of traumatism. It was necessary to raise the bridge all the way to the frontal bone, and at the same time to drop the apex of nose as near a horizontal line with upper lip as possible, and to do this without making an external incision and have no uncomfortable sequelæ was the problem in question.

The measures decided upon were to detach the upper lip and soft tissues of nose away from the cartilaginous and bony portions by an incision from within the mouth by the method first employed by Rouge, of Lausanne (*Nouvelle Methode pour le Traitement chirurgical de l'Ozène*, Lausanne, 1873; *Bulletin de la Société Médecine de la Suisse Romain*, Lausanne, 1868, Vol. ii, pp. 265-68; *Congrès périodique internationale des Sciences Médicales Comptes-Rendus*, Genève, 1878, pp. 337-54; *San Francisco Western Lancet*, 1880-81, Vol. ix, pp. 200-4), for the removal of a nasal sequestrum, and to insert a specially prepared gold plate, following to some extent the idea given to that by Claude Martin, of Lyons (*De la prothese immédiate*, etc., Paris, 1889), in which he reports his method of raising sunken noses by supporting the depressed portion of the nose by a mechanical device made of platinum placed under the skin so as to raise it sufficiently to give the nose a symmetrical shape. These should be, according to Martin, half a millimetre in thickness and seven millimetres in width. These are curved on themselves, and soldered together by gold solder, or sometimes cut out in one piece.

A modification of this metallic apparatus of Martin's was employed by Weir, of New York (*New York Medical Journal*, October 22, 1892), and made by Dr. S. L. Benson, "dentist," and consisted of a platinum support with two lateral legs which were pointed at their extremities, and were inserted into two small holes, which were drilled into the superior maxilla at alæ of nose. The superior extremity of support rested on nasal bones and held in position and were prevented from tilting by two small wires soldered to it and inserted laterally up under the nasal bones.

The gold plate used in this case was made by W. J. Roe; a duplicate was made at the same time, for the purpose of having a second one in case of any accident to the first during its insertion.

The necessity of this was demonstrated in a previous case, in which Dr. Roe had made two gold plates of different size, and during the insertion of the larger, one of the pins was broken off, and the other plate was used instead.

The gold plate was made from eighteen carat plate, twenty-six gauge alloyed with silver, and the props from eighteen carat gold alloyed with platinum, such as is used in dentistry for making clasps. The gold pins were of the same carat, and in making plate nothing but eighteen carat solder was used, so that there was nothing in the finished plate less than eighteen carat.

The plate was closely perforated to allow the tissues to unite on both sides of the plate, allowing better nutrition and also to help fix the plate more firmly, and also the tissues over it. The cost of material for both was twelve dollars. The object of using the clasp metal for props was to hold the pins at their extremity in the holes drilled for them in the thickened anterior portion of nasal process of superior maxilla, and sufficiently far back to be completely covered by soft tissue when in position. The lower extremity of plate was contoured to prevent any possible perforation of lower extremity of nose, and the superior extremity was also slightly contoured to rest against the frontal bone; this, however, was found unnecessary, and was made straight.

The preparatory treatment consisted in frequent spraying of nares and mouth with boracic acid solution for three days previous to operation. On June 28, 1897, ether was administered, and an incision was made horizontally through the mucous membrane of upper lip about one-quarter inch from gingivolabial junction, and about one and a half inches long, and extended into the floor of the nasal chamber. There was just sufficient tissue left attached to the superior maxilla to allow suturing again in position.

The nasal septum was next divided in an oblique lateral direction, the bistoury being carried through the muco-cutaneous border in left nasal chamber, and emerging along the anterior border of cartilaginous septum in right nasal chamber.

Next the mucous membrane on the outer and superior wall of each nasal chamber was divided, a short distance in front of each lateral bony wall. This completed the separation of anterior portion of nose and upper lip.

Next the soft tissue over the nasal bones and cartilage was

dissected up as far as the frontal bone, and laterally sufficiently far to admit the gold plate, and give sufficient free tissue to admit of the necessary raising.

The plate was inserted in position without any difficulty, and a small hand-drill was placed at site of pins, and the bone was drilled, after which the pins dropped in and the spring or clasp was sufficient to retain them in position.

The soft parts were placed in position and the upper lip was sutured, and it was found necessary to carry one suture through from the mouth into the floor of each nasal chamber, in order to hold the floor of the nose at a proper level.



FIG. 1.—“Saddle-nose,” condition before operation.

Next the septum was stitched from side to side, and the value of the oblique division was well proven in being able to close it perfectly without having any perforation, which was feared, considering the amount of dropping of point of nose to secure a proper expression.

The nasal chambers were now packed with iodoform gauze, and a compress was applied over the upper lip to assist in keeping it in better position and maintain the floor of nose at proper level.

The head and shoulders of patient were kept elevated during the operation, and there was not the trouble with venous bleeding that results from the congestion of the face and head, which occurs if the operation is done in the Trendelenburg position. The hæmorrhage, although free, was neither troublesome nor alarming, and was entirely controlled by pressure.

The patient was sitting up on the second day, and the sutures were removed on the sixth, and the lip had united perfectly, also the septum was completely closed.

Patient left for his home July 10, twelve days after operation, and had not had the least inconvenience in any way, and

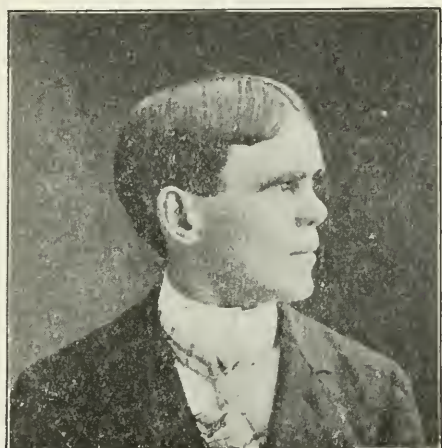


FIG. 2.—Result of operation for correction of "saddle-nose" deformity.

said he believed he could breathe more freely than before operation. The result is shown in Fig. 2, from a photograph taken two weeks after the operation.

Dr. Hearn added that a little over a year ago Dr. J. Solis-Cohen performed this operation upon a man for saddle-nose, and inserted the platinized gold bridge. As a result of the operation, the young man had a fibrous stenosis of both nares, due to a slipping upward of the front part of the nose, and has been obliged ever since to wear a silver tube in each nares. With these tubes, however, he has been perfectly comfortable. Prior to the time of operation the patient had an offensive nasal catarrh, but since the operation this has disappeared entirely.

DR. KEEN referred to a case, which he reported two and a half or three years ago, from which he had not heard for some months, but which he believed to still have a satisfactory result, in which he made an incision across the nose and dissected the skin from the nasal bones, after which he inserted a silver plate, which had been heavily gilded. He doubts the desirability of pins to retain the plate in place, as bone will not tolerate them

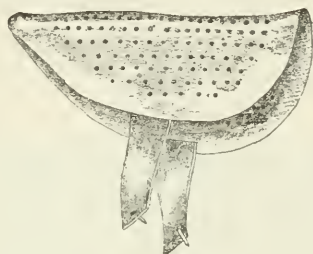


FIG. 3.—Nose-plate.

well. In the case referred to, Dr. Keen was struck with the effect of depressing the tip of the nose which resulted from the introduction of the plate. This lowered the upper lip, which quite improved the appearance of the mouth. The method which he employed was much less complicated than that described by Dr. Hearn. Dr. Weir originally employed gold plates, but later used celluloid.

DANGERS ATTENDING THE USE OF PEROXIDE OF HYDROGEN IN CERTAIN CASES.

DR. KEEN described the case of a child who had a submaxillary abscess, during the cleansing of which a surgeon had employed peroxide of hydrogen. As the gas, which so rapidly formed, did not find a ready escape, there was very marked swelling, which nearly killed the child from suffocation. As it was, the child's life was barely saved after a free incision to permit the escape of the gas and relieve tension. In another case in which a small infected wound at the elbow was being cleansed with peroxide of hydrogen, the tension caused by the inability of the gas to escape from the wound dissected up the intermuscular planes, and spread the infection many times farther than it would have otherwise gone. In a third case of cystitis the blad-

der became greatly distended, and the patient suffered severe pain as a result of the introduction of the peroxide of hydrogen, although the catheter permitted of the escape of sufficient gas to prevent rupture of the viscus.

DR. WILSON referred to a case of cold abscess, which had been evacuated by aspiration, after which a quantity of peroxide was introduced through a canula. Instantly the abdomen distended, the anterior abdominal wall ruptured for a distance of four to six inches, and the intestines protruded.

VALUE OF CASTRATION TO FACILITATE DETECTION OF STONE IN THE BLADDER IN THE PRESENCE OF PROSTATIC HYPERTROPHY.

DR. ORVILLE HORWITZ read a paper with the above title, for which see page 329.

DR. KEEN heartily agreed with the position taken by Dr. Horwitz in his paper. He had been called as an expert in a case of suit for malpractice on account of the removal of the testicles in a case similar to those just described, and he gave an opinion in accord with the conclusion reached by Dr. Horwitz.

DR. ROBERTS called attention to the fact that certain kinds of stones cast distinct shadows, while others are entirely transparent or cast but feeble shadows. This must be borne in mind in judging of the value of a skiagraph in any given case.

DR. HORWITZ thought that the question of crushing or cutting for stone in the bladder is a matter for judgment in each individual case. In old men with infective cystitis and perhaps chronic uræmia he does not think the crushing operation is a harmless procedure. In regard to the suprapubic operation for the removal of calculi, he remarked that the consequences of the enlarged prostate would still remain. This condition could then be attacked later or could be removed first, as had been done in the cases which he described.

EDITORIAL ARTICLE.

THE DISCUSSION OF CONTUSIONS OF THE ABDOMEN AT THE RECENT FRENCH CONGRESS OF SURGERY.¹

THE subject of contusions of the abdomen was introduced at the recent session of the French Congress of Surgery by M. Demons, of Bordeaux, in a systematic paper, in which he said,—

As a result of traumatism there are three classes of cases:

(1) The abdominal walls alone are injured.

(2) The abdominal walls are injured plus one or several organs.

(3) The internal organs are alone injured.

The first question for solution is, Are there, or are there not, lesions of the abdominal viscera? The history of the case given by the patient or witnesses of the accident generally suffices to answer; but this is not always enough.

The resistance of the walls is not identical in all subjects; it varies with age, strength, and embonpoint. Considerable difference arises according to the point struck and the condition of the muscles as regards contraction or relaxation. In experiments on the cadaver M. Demons was surprised at the enormous force necessary to obtain visceral lesions by blows on the belly walls, rigid by rigor mortis. The resistance to injury is not great when the blow is great enough to laugh at all obstacles; when the subject is surprised in sleep or deep intoxication, or when the patient is struck while making a severe effort.

The support to the part injured is provided by the belly walls themselves, generally the posterior. The direction of action of

¹ *Revue de Chirurgie*, November, 1897 (Supplement).

the trauma has much influence; when perpendicular it has every chance to be injurious; when oblique its force is more or less diminished.

The fragility of the viscera has to be taken into consideration. Not only does one viscus differ from another in this respect, but owing to temporary anatomical, physiological, and pathological conditions the same organ varies in its vulnerability. A hollow viscus when distended is more vulnerable than when collapsed. Alteration in their walls invites rupture of viscera. Some organs dislocated from their normal beds are less protected than they should be, others bound down by adhesions have lost mobility which might save them from injury.

Symptoms.—The immediate symptoms vary in nature, modality, and intensity.

Pain is rarely absent; sometimes it is slight, sometimes very severe. The pain may be local or widespread; it may even extend to distant parts of the body. Pain may be spontaneous or provoked. It may be severe in contusions limited to the parietes, and insignificant or transitory when there are grave visceral lesions.

One or two attacks of vomiting with slight or doubtful abdominal distention teach nothing. A common and decisive symptom is abdominal rigidity. With this rigidity there is sometimes a little distention, sometimes a flattening or even an excavation of the belly. This symptom belongs particularly to rupture of the hollow viscera.

The general symptoms are sometimes severe, sometimes *nil*. The presence of shock proves much, its absence nothing.

Having established by association of such symptoms that a viscus is injured, the question arises, What viscus is affected? After having reviewed the symptoms particular to each organ, M. Demons concluded that early diagnosis depended on an association of signs. The point which sustained the blow and the location of the pain have immediate capital importance. The

occurrence of shock, symptoms of internal hæmorrhage, and the appearance of certain phenomena which pertain to lesions of this or that viscus, all these can greatly enlighten the observer. The diagnosis is not only possible but easy in not a few cases immediately after the accident. Thus, severe ruptures of the liver, kidneys, and spleen can be recognized without trouble. One must always remember that many cases are less clear, and in them judgment must be suspended.

The diagnosis of the nature and precise seat of the lesion in a given organ is an enterprise which meets many obstructions. Whether or not several organs are involved is a mere matter of conjecture.

Course.—Trivial cases occur in which the immediate symptoms lessen and soon disappear. Some cases, however, which at first seem trivial become serious, either soon or after a variable period of hours, days, or even weeks. Such are cases in which vessels are injured and temporarily closed, but in which secondary hæmorrhage into the peritoneum takes place, or there is embolism. More commonly in such cases the slight lesion has become infected. As a rarity, a slough separates from the wall of a hollow viscus, liquid escapes, and produces various results according to its toxicity and the place into which it escapes. It is generally in cases of intestinal perforation, accompanied by scarcely noticeable immediate symptoms, that one finds unexpected peritoneal inflammation from extravasation into the serous cavity. One sometimes notices between these two periods a series of precursory phenomena, such as vomiting, and a little pain; at other times there is no warning.

Moderate cases may go on as follows:

- (a) More or less quickly become mild.
- (b) Become sensibly worse and then recover.
- (c) Become suddenly serious.
- (d) Become mild and then serious.

In some cases serious at the beginning amelioration shows

itself more or less rapidly and continues until there is recovery. Cases at first serious may become mild, and at a later date the grave symptoms recur in a lessened or exaggerated form.

Lastly, some remain serious during their whole course.

Diagnosis.—Insufflation of hydrogen per rectum as a means of diagnosis is condemned. So also is the injection of water.

By exploratory puncture we may find: (1) blood effused but not palpable; this measure is uncertain and not without its inconveniences; (2) liquids or gases escaped from their proper visceral cavities,—bile, urine, etc. Puncture has often given good results in cases of rupture of the bladder some time after the accident; (3) at a later date serous fluids, pus, and blood.

Exploratory laparotomy is most seductive; it permits direct examination of the viscera and is the first step in operative intervention, which is the most rational treatment when lesions are present. If it was without danger it would get every vote. But to operate one requires to administer an anæsthetic for a longer or shorter time, and it is wise only to have recourse to operation if its advantages are greater than its inconveniences. Operation may be early, delayed, or late. Early, when there is soon such an assemblage of phenomena that one is thrown into a condition of pessimistic doubt; delayed, when the case at first apparently slight soon exhibits symptoms which cause anxiety; one may delay operation until the patient has recovered from shock. Delayed operations are done in those cases where a longer or shorter time after the accident the patient is in a condition which presumes the existence of visceral lesion. Late laparotomy is done for late complications.

Treatment.—Medical treatment consists in combating shock and internal hæmorrhage if they exist, in soothing pain and immobilizing the injured region or the organs affected with the object of favoring natural recovery and preventing complications. This simple treatment has had much success and is always used by surgeons in cases of severe shock or when the injury is trivial.

Unanimity ceases when cases are doubtful. The method of "armed expectancy" where one is prepared to operate on the first appearance of absolute signs of visceral lesion, but not till then, is dangerous. Experience shows that when the symptoms reveal intestinal lesions, complications have already arisen.

Theoretically, laparotomy is a soul-satisfying procedure. It permits one to keep the peritoneum and viscera from being soiled by noxious liquids, or to remove these liquids if they have already escaped. It permits the sure arrest of hæmorrhage and furnishes the best means of attacking certain late complications. Practically it has not yet realized everything conceived for it. It is, however, certain that its statistics will improve.

Laparotomy ought to be early. The best time to operate is between the primitive and secondary phenomena of the trouble, —i.e., sometimes within twenty hours of the accident. But a number of observations demonstrate that immediate operation has given successes which would probably have been impossible after from ten to twenty hours, and therefore it is preferable. There is only one formal contraindication to laparotomy, and that is shock so great that the patient could not support the surgical trauma. There is little to say about the operative technique. A little cleansing is all that is required for a superficial laceration of a full organ; for deeper rents suture is good, and if this is impossible packing may be practised. Multiple tears or pulverization require resection or extirpation if the organ is not necessary to life. Hæmorrhage is dealt with by ligation, forcipressure, or packing. Rupture of hollow viscera requires suturing. If the hollow viscus is not necessary to life it may sometimes be better to remove it. Rupture of excretory tubes (*conduits excréteurs*) requires sometimes suturing, sometimes anastomosis into its normal reservoir, or an accidental cavity, sometimes the extirpation of the organ from which it arises.

In the discussion which followed—

M. Le Dentu considered the diagnosis always difficult, and

finds the classification of cases as slight, medium, and grave to be artificial. Rupture of the kidney and bladder is easily diagnosed. It is not so with other viscera where the diagnosis is particularly hard because of the complexity of the lesions and of the symptoms. In most cases in spite of minute analysis doubt remains, and one is puzzled to know whether to treat expectantly or by exploratory laparotomy.

Parietal lesions often do not correspond to the visceral injuries, and have no great value in diagnosis; yet a large hæmatoma arouses suspicion regarding muscular rupture or injury to the peritoneum, and ought to be investigated by incision. Cutaneous hyperæsthesia is of great importance, and by itself justifies laparotomy. M. Le Dentu does not put much faith in abdominal retraction when it exists alone, but it is to be considered when associated with other signs,—*e.g.*, the facies, alterations in the voice, and the pulse. If inspirations are as frequent as 28 or 30 per minute, it is necessary to operate. The same must be done when the extremities are cold. Diminution or suppression of urine, which must not be confounded with retention, equally constitutes a symptom of great value. Two things must be inquired into in face of an abdominal contusion,—is there shock from hæmorrhage or shock of the nervous order? In the first case there can be no hesitation. Grave cases of contusion do exist with no symptoms, but their number will diminish *pari passu* with increasing knowledge of symptomatology.

When symptoms justify operation, it must be done as quickly as possible, but, except when grave hæmorrhage necessitates immediate action, it is better to leave the patient one or two hours to recover from the initial shock. Sometimes operation is entirely contraindicated because of excessive depression, but it may be better even to risk operation than to be too ready to renounce all chance that a laparotomy may give. In such circumstances one makes his arrangements so that it may be done as simply and rapidly as possible.

M. Michaux (Paris) sought to establish that laparotomy is the only serious method of diagnosis and treatment. The signs of abdominal contusion do not always correspond to the amount of violence exercised. This hopeless conclusion is sustained by the results of the study of symptomatology. Nothing indicates whether a trauma will have benign or grave consequences; neither the peritoneal shock, the pain, the cutaneous hyperæsthesia, the abdominal retraction, nor the dissociation of pulse and temperature are sufficiently constant to be used as bases from which to judge of the urgency of operation. Exploratory laparotomy remains our sole means of diagnosis and treatment.

Expectancy and armed expectancy are identical. This doctrine he supported by reference to 289 cases,—254 treated expectantly with 178 recoveries and seventy-six deaths; thirty-five laparotomies, ten recoveries. Among the twenty-five fatal laparotomies sixteen were done for peritonitis, not for abdominal contusion. The principal rules for laparotomy are the following:

(1) Laparotomy as early as possible after shock has passed.

(2) Rapid operating; evacuation of blood with the aid of large sponges; methodical exploration of the gut; evisceration only when one finds alimentary *débris* or fæcal matter.

(3) Leave the abdomen open to a large extent at the end of the operation, protecting dangerous areas with iodoform gauze.

Every endeavor must be used to save the patient by injections of serum into the veins, and by abundant peritoneal flushing with salt solution and permanganate of potash.

M. Moty (Lille) considers early diagnosis of essential importance. In the absence of pain following the absorption of fluid, taken by the mouth, which is often absent when the intestinal perforation is not highly located, pulse acceleration forms one of the most certain signs of grave lesions, and permits a distinction being drawn between peritonism and true peritonitis from fæcal extravasation.

In cases of probable or evident severity operation is clearly

indicated. Especially is this true in cases with great immediate shock, which one is too apt to consider hopeless. The first result of a laparotomy and the suture of a perforation is a feeling of comfort and security experienced by the patient. M. Moty thinks a certain number of injured, otherwise inoperable, might be saved by laparotomy under cocaine anæsthesia aided by injections of artificial serum.

M. Tachard (Nantes) described two recent cases of abdominal contusion from the kick of a horse. The analyses of these cases led him to reject the expectant or chance treatment, and adopt in every case laparotomy performed as soon as possible. Frequency and feebleness of pulse ten to fifteen hours after the traumatism are a contraindication to delayed operation.

M. Tédénat (Montpellier) believes that clinical signs by themselves do not suffice for a diagnosis as to the gravity of a case.

He has done three laparotomies with two recoveries, and one death from too early absorption of a catgut intestinal suture.

M. Doyen (Paris) spoke of some points in the technique of the operation which should only be attempted after recovery from the initial collapse. Parenchymatous hæmorrhage—*e.g.*, from rupture of the liver or spleen—is best stopped by directing on the visceral wound a jet of steam under pressure, care being taken to isolate the organ with sterile compresses (Sneguireff's method). If there is infection, flushing often leads to diffusion of the trouble, though in certain cases *local* douching may exceptionally be used. The employment of steam is here a great aid, and admirably disinfects surfaces already inflamed, into which no other antiseptic means could penetrate. Tamponade is good when complete closure of the belly would be dangerous. In no case, however, ought the tampon to be free in the peritoneum. The part tamponed is liable to suppuration. A few mesenteric or mesenteric-parietal sutures ought to provide for the separation of the packing from the rest of the cavity. M.

Doyen showed a new drainage-tube, the abdominal end of which was protected from having its opening plugged by gut, etc.

M. Fevrier (Nancy) reported one case of abdominal contusion from a horse's kick, with three incomplete rents of the cæcum, two from crushing, one from bursting. Such incomplete ruptures are rare in man. In experiments on dogs one meets incomplete rents caused almost exclusively by crushing, where the mucous membrane being more friable is more injured than the muscularis, so that the injured area forms a cone with its apex external, while the serosa, but bluish, thin, and folded, bridges over the defect in the two other tunics. In man, besides the preceding variety, incomplete rupture by bursting occurs. This is characterized by rupture of the serosa with mere bruising of the two inner coats. Here the cone has its *base* exteriorly. To produce it, all that is required is that two limbs of an intestinal loop, containing liquid, be strongly compressed together. Such a force produces with regularity a complete or incomplete rupture. Above and below two perforations by crushing are always to be found on the two limbs of the loop. In the cæcum, when the upper part is simply contused, the tension of the contained liquid is suddenly increased sufficiently to produce rupture, since the ileo-cæcal valve is not to be forced. The speaker reported a case of this kind, the result of a severe kick from a horse. Consciousness was lost. Some hours afterwards, the general condition being good, operation was performed because of acute tenderness over cæcal region. There were three incomplete rents; one superior, by crushing, causing a large loss of substance, covered by a thin and dark layer of serosa. Two centimetres lower there were two incomplete perforations, from bursting, where the muscularis was laid bare for a distance of two centimetres. Suture. Quick recovery.

These ruptures are rarely diagnosed, because, at first, their symptoms are mild and they are left until "peritonitis foudroyant" has developed. They belong to Moty's class, presenting

mild or medium symptoms, terminating abruptly after a few days.

M. Nimier (Paris) came to the following conclusions from personal experience of horse-kicks on the belly. The patient must be examined in hospital, and notice taken of the nature of the accident, of his condition as to shock, etc. Every two hours the temperature, respiration, pulse, and all symptoms, local or general, must be recorded in writing. If peritoneal reaction or general infection show themselves, operation must be resorted to. This ought to be done too early rather than too late. Laparotomy in these cases, as a primary and exploratory measure, is liable to be useless if not injurious; on the other hand, as a secondary measure it confirms the diagnosis of perforation, and is the first step in the only treatment capable of saving the patient.

M. Guinard (Paris) has operated seven times during the past year for abdominal contusions. The first case seen, three hours after the accident, showed symptoms of internal hæmorrhage. The great omentum was found torn near the stomach. Ligatures were applied. Death. Post mortem showed rupture of renal vein and hæmopericardium.

The second case refused immediate operation. After vomiting he permitted exploratory puncture, and blood being found, he was operated on. There was rupture of the renal artery; the gut was healthy. Recovery. Right nephrectomy was performed after eighteen days for persistent hæmaturia.

The third case was operated on twelve hours after the accident. There was a tear in the gastro-hepatic omentum, a bruise of the head of the pancreas and a rent in the liver. Ligature of vessels; suture of liver. Recovery.

Fourth case: Operation one hour after accident. Two wounds in jejunum; suture; recovery.

Fifth case: Symptoms of internal hæmorrhage; operation. Hæmorrhage from an omental artery. Splenic vein ruptured. Death in six hours. The other two cases have been published. Both died.

M. Rioblanc (Lyon) reported two cases in one of which the clinical symptoms seemed to prove conclusively that there was perforation. Thorough operation revealed no lesion. Recovery. In the other case there were practically no symptoms until one hour before death, which took place twenty-one hours after the accident. The autopsy showed the peritoneum full of blood and fæces, rupture of the small intestine, rent of the mesentery, crushing of the inferior surface of the liver, and contusion of the right renal artery. M. Rioblanc made a strong plea for very early exploration.

JOHN F. BINNIE.

REVIEWS OF BOOKS.

PATHOLOGICAL TECHNIQUE. A Practical Manual for the Pathological Laboratory. By FRANK BURR MALLORY, A.M., M.D., Assistant Professor of Pathology, Harvard University Medical School, and JAMES HOMER WRIGHT, A.M., M.D., Director of the Laboratory of the Massachusetts General Hospital. Pp. 397. Philadelphia: W. B. Saunders, 1898.

The authors have written a book which is unique in the English language, and in some respects in any other. The work fulfils the promise of the subtitle in that it is absolutely practical, and contains not the slightest trace of padding. The graduate of a few years ago may well think that the lot of the student of to-day is to be envied when he now has the aid of such manuals. The publication of such works is also a token of the demands of the present time. It is quite possible that ten years ago publishers might have hesitated before undertaking the expense of putting so handsome a book on the market.

The whole plan of the work is simple and consecutive.

Part I, 67 pages, is devoted to post-mortem examinations. Part II, 133 pages, to bacteriology,—it is so good that it seems too short. Part III, histological methods, comprising the remainder of the book, will undoubtedly prove the most valuable portion, and has evidently been prepared with great care. The compilation of the various formulæ of the staining solutions is most exhaustive and up to date. Here are described the stains which bear the name of the senior writer, especial interest attaching to his beautiful stain of the neuroglia-fibres, which he brought

out shortly before the announcement of a somewhat similar process by Weigert on the occasion of his fifty-year jubilee.

While the authors, in their capacities as active teachers, have especially borne in mind the requirements of students, the book appeals and will become a necessity to all who are engaged in more advanced studies. It is freely and well illustrated.

CHARLES L. GIBSON.

THE PERITONEUM. By BYRON ROBINSON, B.S., M.D., Chicago.

Part I, Histology and Physiology. Royal 8vo, 247 illustrations; 400 pages. Chicago: C. V. Waite & Co., 70 State Street.

In the introduction to his work Dr. Robinson quotes from Professor Virchow "that historical information concerning medical subjects diminishes with each generation. of students is one of the worst phases of the present developments of the profession. As a rule, it may be assumed that knowledge of even the best informed younger workers covers a period of three to five years only. Publications of five years past do not exist for them." While this pessimistic view of the great pathologist may be applicable to many students and writers, it surely is not applicable to the present work of Dr. Robinson. Rarely does a volume appear in which the past and the present are so thoroughly and satisfactorily blended.

For many years the author has been at work at the dissecting-table and with the microscope to discover and correlate observable facts relating to the peritoneum. The labors of others have also been consulted, and now the first volume of what bids fair to be the most thorough and comprehensive book ever published upon the subject has just been printed.

The historical sketch with which the volume opens is composed of a series of brief biographies of every anatomist whose researches have added to our knowledge of the great closed

cavity of the body, and contains many interesting facts that are not generally known even to the historical student.

The first portion of the book is devoted to the histology of the peritoneum, and contains a detailed account of the various elements—endothelia, subperitoneal tissue, blood-vessels, lymphatics, and nerves—that are blended in its structure. The subject has been divided into chapters to facilitate reference and study, and an attempt has been made to make each chapter complete in itself; as a result, there is more or less repetition, but for one who wishes to quickly find out the essentials of any one of the various parts, this can scarcely be called a fault. The illustrations are numerous, large, and very well executed; they are for the most part quite new, and are camera lucida drawings directly from preparations made by the author himself. The technique used in securing these satisfactory results is definitely stated in many places throughout the text, and there is a good summary of the various methods that may be employed, grouped together and forming a separate chapter.

The other subject with which the volume is chiefly concerned, the physiology of the peritoneum, is presented in the same thorough manner. The various experiments with carmine, Berlin blue, direct and indirect injections, the great variety of animals that were experimented upon, and the technique used in the animals that have been found to give the best results, are all well described, and an excellent *résumé* given of those facts.

Over 100 pages at the end of the volume are devoted to a closely printed bibliography of the peritoneum, and the claim is with justice made that it is the most extensive and complete of any that has thus far been published.

Dr. Robinson has made a valuable contribution to medical literature. Not the least that can be said in the way of praise is that while there is no especial pretension to literary style the text is unusually well written, concise, clear, and logical. It may be that the dictum of Ruskin was in the author's mind while

he was writing. "Certainly it is excellent discipline for an author to feel that he must say all he has to say in the fewest possible words, or his reader is sure to skip them; and in the plainest possible words, or his reader will certainly misunderstand them. Generally, also, a downright fact may be told in a plain way, and we want downright facts at present more than anything else."

HENRY P. DE FOREST.

SPINAL CARIES. By NOBLE SMITH, F.R.C.S. (Ed.), L.R.C.P. (Lond.). London: Smith, Elder & Co., 1897.

This is the second edition of this work, the first of which has been so well received. In this edition the errors of the first have been corrected, a new index has been supplied, a new form of head-piece for cervical disease has been described, and some remarks upon the forcible reduction, under chloroform, of the deformities of spinal caries have been added. The author states that he has become more firmly convinced that spinal caries is generally a curable disease, but that success depends, above all things, upon accurate support of the spine. He deprecates the custom of surgeons of leaving the construction of the apparatus entirely in the hands of the instrument-makers.

This work is based chiefly upon the author's own experiences. The illustrative cuts are made from his own drawings. He states in the preface, "I have further traced and drawn in ink all these subjects for the ultimate blocks, so that if any misrepresentation occurs, I alone am responsible." The book contains a great deal of practical information.

JAMES P. WARBASSE.

TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIATION.
Volume xv, 1897.

In these transactions from year to year are being presented the subjects which are foremost in the surgery of the day. Thus in this fifteenth volume are papers and discussions upon the in-

dications for and the technique of hysterectomy, the Röntgen rays in surgery, the surgical treatment of suppurative pericarditis, the technique of intracranial surgery, the operative treatment of irreducible fractures, gastrorrhaphy, surgical treatment of congenital ano-rectal imperforation, ureteroplasty, and the origin of appendicitis. The volume contains the twenty-five papers and their discussions which were presented at the last meeting of the association, held in May, 1897, at Washington. J. Collins Warren being president. We believe that our memory serves us correctly as to the place of meeting, as it is not specified in the book.

The president's address on the influence of anæsthesia on the surgery of the nineteenth century, coming, as it does, from a man whose genealogy is so closely bound in the development of surgical anæsthetization, is intensely interesting. Dr. Warren tells us that scarcely fifty years ago, Robert Liston, in a lecture in the University College Hospital, said concerning operative surgery, "This is regarded as an inferior part of our professional duties, and truly it is so. The field of operative surgery, though happily narrowed, is still extensive." The author has heard his father say, "I am often nearly disgusted with surgery."

This volume also contains the history of the Gross statue, and the addresses delivered at the unveiling exercises in Washington, in May, 1897. The papers are all of a highly scientific order, and the discussions do credit to the association. Particularly has the work of Dr. De Forest Willard, the editor of the transactions, been well done.

JAMES P. WARBASSE.

CORRESPONDENCE.

To the Editor of ANNALS OF SURGERY:

DEAR SIR,—I find in the *Journal of the American Medical Association* for November 21, 1896, a cut and description of an aspirator-needle with a groove like a director, which is exactly the same instrument which I have described in the January number of the ANNALS, and which was invented by Dr. J. A. Dibell, president of the Arkansas Industrial University. Dr. Dibell's instrument antedates mine by more than a year, and is entitled to priority.

Yours sincerely,

JOHN HOMANS.

TO CONTRIBUTORS AND SUBSCRIBERS.

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ANNALS OF SURGERY,

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OBSERVATIONS UPON THE ETIOLOGY OF TUMORS.¹

By FRANK HARTLEY, M.D.,

OF NEW YORK,

SURGEON TO THE NEW YORK HOSPITAL.

ONE of the manifold duties devolving upon the surgeon is the assumption of the *rôle* of managing agent in the study of what we class to-day under the head of *tumors*. He comes in contact with the patient before, during, and after the operation, and should suggest the various investigations to be made, in order to definitely determine the nature of the growth. Yet he to-day seems to be entirely engrossed in the limited sphere of the enucleation of the mass, apparently wishing to leave to any one its examination, and frequently satisfying himself with an account, based upon the arrangement and character of cells taken from a small section of the tumor. He should take a higher position in this matter, and should direct the disposition of the tumor to the proper channels for investigation, being alive to the knowledge embraced in the anatomy, embryology, teratology, histology, pathology, and bacteriology, in so far as they may have reference to the growth. I firmly believe that if the surgeon would act in this capacity, a great deal of material now wasted would be intelligently utilized, and that our views in regard to tumors would be greatly modified or completely changed in the next few years.

In a purely clinical aspect, certain tumors appear during intrauterine life, being present at birth, or manifesting themselves first during childhood or adolescence. Among these

¹ Read before the New York Surgical Society, January 26, 1898.

may be mentioned some osteomata, chondromata, fibromata, adenomata, and heterologous tumors in or near the kidney, parotid gland, testicles, or brain.

A certain number, again, appear to follow inflammation, especially when it is accompanied by cicatrization or ulceration. Such tumors may be seen in the larynx, at the pyloric end of the stomach, in the gall-bladder, and at the site of the tubercular and syphilitic granulomata.

A certain number, again, seem to follow an injury or injuries. This influence appears to be present in about 7 to 18 per cent.

The atrophy of tissue elements has apparently an influence in the development of cancer, in that it lessens or removes certain opposing forces to its advancement, just as heredity, the want of resistance or predisposition to tumor-formation appears to exist in from 5 to 15 per cent. of the cases of malignant disease. (The value of statistics in heredity must necessarily depend upon the care of the investigator and the intelligence and knowledge of the patient.) This is the purely clinical aspect under which we meet tumors. The theories of the origin of tumors, however, must be considered, in order to appreciate the drift of the thought expended upon the solution of this question.

In the Cohnheim theory, no other cause is recognized than a failure in the embryonal deposit,—that is, an excessive production of cells in an early stage of embryonal life, which cells are not completely utilized in the formation of the tissue. Trauma can convert such a benign or unrecognized new growth into a malignant one, but it cannot, of itself, produce a tumor.

Virchow places the cause in local disturbances, hereditary or acquired in later life, as the result of trauma or pathological processes (inflammation and ulceration). These conditions may not only favor but give rise to a new growth.

That mechanical or chemical insults were able to produce the necessary local disturbance was not admitted by Billroth. He distinctly maintained that something else was

necessary,—namely, a specific “disposition of the individual.”

Lücke maintains that local irritations and injuries, especially mechanical, are only occasioning causes, and that greater importance is to be ascribed to the general predisposition of the individual.

Löwenthal, who collected some 800 cases of tumor-formation, believes that the majority furnish enough proof to suppose that external irritation can occasion a tumor, in that it involves cell elements not utilized in normal tissue-formation or other tissues are involved which react abnormally.

Löwenthal's 800 cases comprise 316 sarcomata, in 287 of which the kind of trauma was known. Liebe, in 343 cases, found that trauma preceded the development of the growth in 10.8 per cent.; Wolff, in 574 cases, in 50 per cent.; Gross, in 165 cases, in 14.3 per cent. Wild, in 423 cases, found fifteen cases in which a single severe blow preceded the development of the growth. Kirchner, in 76 cases of sarcoma, found ten cases in which trauma preceded the appearance of the tumor. Tillmann has collected 499 cases of malignant tumors, comprising 328 carcinomata and 171 sarcomata. Of the 328 carcinomata, thirty-five developed after a single blow, and ninety-two followed upon chronic irritation. Of 171 sarcomata, thirty-five followed a single blow, and thirty-two developed upon a chronically irritated area. In the whole number (499) we have ninety cases following a single blow (18 per cent.) and 124 developing upon a chronically irritated area (25 per cent.). This summary substantiates the theory of Virchow, as well as the commonly accepted view, that sarcoma is more frequently referred to a single blow, while carcinoma is referred more often to chronic irritation. Sarcoma: 20 per cent. to injury; 19 per cent. to chronic irritation. Carcinoma: 11 per cent. to injury; 28 per cent. to chronic irritation.

It is the belief of Ribbert that tumors arise before and after birth from a partial or complete separation of cells or groups of cells from their organic connection. The cells

withdrawn from the influence of a cell association of their own, where they maintain a vegetative activity, and are situated in a tissue suitable for their growth, grow and form tumors similar or dissimilar to the organ from which they arise.

Chondromata may thus arise from anomalous ossification of the epiphyses of bones, sarcoma from the periosteum or medulla of bones, epithelial or epidermoidal tumors from the epidermis. The cell groups may be separated from their association by traumatism or connective-tissue contraction. They may likewise be due to foetal displacement of cells, either connective tissue or epidermis.

Hauser maintains that the theory of a simple misplacement of cells producing a tumor is not proven by Ribbert, at least for the carcinomata, since this can only depend on fundamental change in the biological and morphological properties of epithelial cells, giving them a distinct biological and morphological difference from the mother cells. This unknown agent or factor, Hauser maintains, probably exists in the connective tissue, and exerts itself first upon the epithelial cells, just as a simple atypical epithelial growth is derived from pathological processes in connective tissue. Scheurlen and others have found harmless saprophytes, as well as staphylococci, streptococci, and bacilli, in the foci where softening was taking place in a tumor. Zahn, Hauser, and Ribbert have shown them to exist in tumors not exposed to the air. These are, however, of no importance, since all tumors due to the schizomycetes are formed of granulation tissue, and consist of leucocytes and young connective tissue, whereas all metastases of carcinoma consist essentially of epithelioid cells similar to the focus.

Darier, Albarran, Malassez, Thoma, and Wickham believe in the parasitic origin, and attempt to prove that carcinoma is due to protozoa, especially the sporozoa. The views expressed by them are not satisfactory nor similar, contradicting one another, not only in their frequency, but also in their form and character.

Adamkiewicz and Pfeiffer consider the carcinoma cell the specific parasite, and not a derivative of other cells. The protozoa, as a cause of carcinoma, Hauser considers of no avail, since only in malaria, and in the intracanalicular papilloma of the biliary ducts, and in a few diseases in animals, has the proof been incontestable. Possibly, though not completely, proven is their causal relation to *molluscum contagiosum* and dysentery.

Schwartz also criticises severely the protozoan theory, and the extreme views of Adamkiewicz and Pfeiffer. From investigations made upon absolutely fresh preparations, he believes all these cell-inclusions are degeneration products of epithelial cells, leucocytes, and their derivatives.

Maffucci and Sirleo deny any pathogenic properties existing in the blastomycetes of Sanfelice and others. From personal observations they are led to believe that the blastomycetes produce a chronic inflammatory process, such as a new formation of tissue, but not tumors, either carcinomata or sarcomata.

The theories of the etiology of tumors give us but little definite knowledge, beyond the possible causes, yet the advances in later years in pathological histology, embryology, and bacteriology have aided our knowledge, and allowed us to at least restrict the term.

Virchow first separated the infectious granulomata from the tumors, and they were subsequently shown to be due to micro-organisms. The leprous nodule, the farcy nodule, the tubercular gumma, actinomycosis, and possibly the syphiloma. Then the hydatid cysts were restricted to the cystic stage of the *tænia echinococcus*.

Cohnheim's theory of the origin of tumors was the great incentive to the investigations into the "vestiges" and "rests,"¹ and has led to a thorough study of embryology and teratology, restricting again the number, and including many under the congenital malformations.

In the non-epithelial tissues, such rests are difficult to demonstrate. Isolated islets of cartilage have long been

known to exist in the epiphyses of rachitic children, and, it is probable, as Ricker and Sutton suggest, that some uterine myomata are sequestered portions from the union of the Müllerian ducts. Von Recklinghausen, indeed, considers some adenomata and cystomata of the uterus as rests from the Wolffian body. Birch-Hirschfeld places the origin of some adenomata of the kidney among the rests from the Wolffian body, while Grawitz maintains that some of them are due to sequestered portions of adrenal tissue. These and other well-known instances of cysts and cyst-adenomata, due to a glandular rest or vestige, and not to trauma, inflammation, or a parasite, will allow us to again restrict the term.

Many lymphadenomata and so-called lymphosarcomata have likewise been taken from the tumor list, and classed as varieties of tuberculosis, leukæmia, pseudo-leukæmia, or as diseases *sui generis* (malignant lymphoma).

The rhinoscleroma, the *molluscum contagiosum*, the mycosis fungoides (Alibert), and certain enlargements of the thyroid gland, especially where combined with cretinism, have, of late, been placed among the disturbances of nutrition or the infectious processes, though formerly recognized as true tumors.

The tumors which do not apply to the theory of vestiges, rests, and teratological formations, nor alone to an inflammatory process nor traumatism, are the sarcomata and carcinomata.

Many facts indicate that cancer is induced by minute organisms, since, by analogy, in origin, course, and constitutional involvement, it is similar to those diseases which we know to be parasitic in origin, as well as the fact that those organs and glands which are in contact with the air and intestinal gases are the most prone to cancer,—*e.g.*, the breast, the rectum, the stomach, and the cervical canal of the uterus, in contradistinction to the body of the organ.

The same view is held of sarcoma, yet they are not believed to be due to the same cause, nor can the varieties of each even be said to depend upon a single cause, simply

because of the structural likeness, for, as Virchow remarks, no neoplasm contains cells which are, in a strict sense, specific to it.

The cells of the peritoneum have been variously looked upon as endothelial and epithelial. In the infectious diseases, syphilis, leprosy, and tuberculosis, we also find peculiar cells, giant-cells, "Mastzellen," and epithelioid, derived from connective tissue, and often indistinguishable from epithelial cells. This is shown by Schöbl, and more recently by Volkmann, Jr., in the endotheliomata.

Quincke and Rieder attempted to establish the fact that carcinoma cells in exudates (pleural and peritoneal) might be distinguished from endothelial cells by the large number of mitoses, especially asymmetrical division forms, and by their glycogen reaction. From the fact that endothelial cells in effusions exhibit such a diversity in size and shape, and show a similar vacuolation, fatty degeneration, and often abundant mitoses, many investigators declare it impossible to differentiate them from carcinoma cells, unless definite bits of tissue, showing a definite structure, can be examined. The possibility, then, of the secondary deposit in cancer having its cells develop by growth and differentiation of indifferent connective-tissue cells may be true (Virchow, Gussenbauer, Stricker, Klebs), for the rule that so-called epithelial cells can only be derived from epithelial cells may be true for normal conditions, but not for pathological ones.

But we cannot verge too far in the tendency to disregard the genesis, character, and the relation of cells to the tissue in which carcinoma and sarcoma develop, for it is a fact that the cells of both depend, for the greater part of the tumor, upon the nature of the parent tissue from which they develop ("*omnis cellula e cellula ejusdem generis*," Thiersch and Waldeyer), although the new cells possess distinctly different morphological and physiological characters from those of the cells from which they take their origin. There exists certainly a fundamental biological difference between the metastases of malignant tumors and those of

infectious diseases, in that in one micro-organisms and in the other the cells (so far as we know) represent the means of extension of the disease. The biological process and the anatomical conditions cannot be combined to substantiate at the present time the parasitic theory. The constant failures in inoculating animals may appear at first as evidence against a parasitic theory, yet we know the same condition exists in other undoubted infectious diseases, as leprosy and syphilis.

It is probable that trauma exerts a primary influence in some retention cysts, implantation cysts, in some so-called cystic adenomata, as well as probably in some fibromata, lipomata, enchondromata, and osteomata. This may be seen in many of the simple retention cysts, in epidermoidal cysts, in the cystic tumors of the breast, involving the ampullæ and larger ducts (Nasse), as well as in some fibromata and lipomata, enchondromata, and osteomata following injury to connective tissue or bone.

The injury in this case probably induces a *locus minoris resistentiæ*, in that in the disorganization of the tissue vessels are closed, the circulatory character is changed, and an occasion for the deposit of tissue elements is given, which either develop into scar tissue, and produce by the obliteration of ducts retention cysts and the so-called cystic adenomata, or by the enclosure of abnormal elements, where they maintain a vegetative activity (Ribbert), epithelial, fatty, and connective-tissue tumors (benign).

Injury in sarcoma and carcinoma is, I think, an occasioning cause, and is generally expended upon tissues, the result of congenital rests or inflammatory processes. In those in whom these conditions do not exist, we must accept either a general predisposition in the individual or a local disturbance in nutrition, evidenced by a deranged functional activity in the cells, with the production of chemical toxins or by the presence of micro-organisms with their ptomaines. The predisposition cannot be denied absolutely, although one would expect to see more cases of multiple sar-

comata and carcinoma in those who have either variety, since injuries will constantly occur in such persons. In such cases of multiple tumors of this variety, they can generally be explained by metastasis, by direct implantation, by congenital defects, and, rarely, by multiple injuries alone. The presence of both carcinoma and sarcoma in the same individual must be looked upon as a purely accidental condition. The injury acts as an occasioning cause, and is followed by a parasitic infection or by a disturbed functional activity in the cells of the injured tissue with the development by these cells of toxins. The primary cause of this deranged functional action in the cells must remain unknown until the biology and chemistry of cell-action are better understood. Congenital formations, the new formations following inflammation, and, in some individuals, injury alone, seem to be predisposing agents in developing this deranged functional activity.

Inflammation, used in a broad sense (disturbed nutrition), acts as a primary cause in many so-called tumors. As an interstitial process, it causes by its scar tissue the obliteration of ducts and the formation of retention cysts and the so-called cystic adenomata. As a parenchymatous process, involving the epithelium alone, and not extending beyond the *membrana propria*, it causes the multiple and circumscribed cystadenomata, proliferating cystadenomata, by a process both parenchymatous and interstitial, some so-called adenofibromata (Nasse). These simple hyperplastic glandular processes, if they follow inflammation and ulceration, as in the intestine and uterus or breast, are considered as evidences of reproductive activity, following, in the main, the pattern of the gland, but really appearing as an atypical glandular formation.

If the signs of inflammation are wanting, or slightly marked, they are considered as hypertrophic productions from an unknown cause. These atypical glandular growths should not be confounded with true adenomata, for they often belong among the regular phenomena of a distinct

diseased condition. True adenomata are by no means common, and if we exclude the adenocarcinomata and the cyst-adenomata, they may be properly considered as sequestration adenomata, such as occur in the liver, spleen, kidney, and broad ligament from adrenal implantation in the uterus from sequestered portions of the Wolffian body, etc.

Inflammation, again, offers an occasioning cause for a great number of carcinomata, as carcinoma and leucoplakia (Schuchardt), carcinoma and paraffin dermatitis; facial cancer and chronic seborrhœa, Paget's disease, and the eczemata, carcinoma and syphilitic ulceration, carcinoma and lupus; carcinoma engrafted upon tubercular cavities in the lung, carcinoma developing upon the scars of burns and former ulcers.

Fully 70 per cent. of all malignant tumors develop upon the most maltreated and frequently inflamed organs. The stomach, 34.97 per cent.; the breast, 4.3 per cent.; the uterus and vagina, 18.5 per cent.; the large intestine and rectum, 8.1 per cent.; the face and lips, 4.9 per cent.

It is probable that the diseased tissue either offers the atrium for micro-organisms, which, slow in growth, are only able to develop upon ill-nourished tissues, or that the nutritive disturbance in the tissue cells results in a deranged functional activity, with the production of chemical toxins.

The third cause we consider the congenital anomalies, either the misplacement of germinal fragments or the remains of foetal formations. They include the cysts of former canals or ducts, the vascular and lymphatic growths, the adenomata, the epithelial and connective tissue rests, as well as the endogenous and ectogenous teratomata.

As cysts, we find the tubulodermoids, the ovarian dermoids, the tubulocysts, and the neural cysts. As adenomata and rests, the adenomata of the pituitary gland of the accessory thyroids, and of the ovary, the sequestration dermoids, the adrenal implantations in the kidney, liver, and broad ligaments of the Wolffian body in the kidney and uterus, as well as many fibromata and enchondromata. Here might also be

mentioned the elephantiasis congenita, the plexiform and multiple neurofibromata, and the multiple exostoses and enchondromata.²

As vascular and lymphatic growths, the hæmangioma simplex and cavernosum, the angioma arteriole racinosum, the lymphangioma simplex and cavernosum.

As teratomata may be mentioned, the parasitic foetus, and the tumors developed from imperfect anterior and posterior dichotomy. We would place the carcinoma and sarcoma in a separate class of disturbances in nutrition, which have for their cause or causes unknown agents. We do this because of the fact that the analogy between malignant tumors and infectious diseases is rendered incomplete, owing to the character of the metastases, but we do not lose sight of the fact that in all other points they agree, and that the apparent antagonism between the anatomical conditions found in malignant tumors and the biological process, may be dependent on our own inadequate knowledge and methods of investigation.³

Lubarsch goes so far as to say that every new growth in case elements of the same enter the blood and lymph-channels, and the resorptive power of the body is diminished, has the power to cause metastases.

We admit that certain enchondromata, adenomata of the thyroid, of the liver, biliary passages, and myomata or adenomata of the uterus, stomach, and intestines, have been reported as having metastases, but we can hardly consider this fact as militating against the specific characters of carcinoma and sarcoma, when compared with benign tumors. We all know that many glandular formations in mucous membranes and within glands (simple and hyperplastic) cannot be differentiated from true adenomata, just as some adenomata cannot be distinguished from adenocarcinomata. It, indeed, becomes a matter of the individual judgment alone whether the investigator places the growth in the one or the other class.

This is especially the case in the intestinal tract, where

adenomata, which should be classed tubular adenomata, show a marked malignancy by their extension in the surrounding tissues, and not infrequently are followed by metastases. If we judged these growths by their purely histological characters, we call them adenomata; if by their course and behavior to the surrounding tissues, carcinomata,—that is, adenocarcinomata.

So also in the enchondromata, we know that where the tumor is represented by a distinct and genuine cartilage, it is a benign growth, and that in certain cases only, where the cartilage represents probably a purely transitional tissue, do we find metastases, unless it be that an injury or repeated injuries to a benign enchondroma have been followed by sarcomatous degeneration.

In the myomata as well, we are satisfied that a pure example of such a growth is a distinctly benign process, whereas when the growth contains cells which can be distinctly recognized as muscle-fibres, and, in addition, cells which have no specific character, it becomes a myosarcoma, and may cause metastases.

In fifty-one cases of mixed congenital growths of the kidney in children (Walker) the metastases were of a sarcomatous nature in all excepting one instance, in which striped muscle-fibres were found in what was thought to be a metastatic nodule in the diaphragm.

In a case of teratoma colli, in a child of nine weeks of age, Popovac described the growth as consisting of embryonal tissue, with changes towards higher types of tissue, bone, cartilage, striped and unstriped muscular tissue, as well as of glial tissue and ganglion-cells. In three distinct nodules removed from the neighborhood of the main growth, and which Popovac considered lymph-glands because of their capsule and the lymphoid tissue beneath the capsule, he found the same embryonal tissues together with the glial tissue, but without the ganglionic cells. The question, in this case, seems to be whether Popovac has fully proven the outlying nodules to be lymphatic glands. If so, we must ex-

plain this fact by the inherited power of transplanted cells to develop after their own type up to the time that their characters and function are completely altered by their environment (Sarcoma).

If these nodules do not represent glands, then we are to consider the case as one of multiple teratomata in this region.

The constitutional effects produced by both carcinoma and sarcoma may be due, in part, to the degeneration and ulceration of the tumor, by means of which large amounts of albuminous material are lost, as well as to the putrefactive processes within the tumor, by which injurious substances act upon the system. The probability that malignant tumors, when the above conditions do not exist, develop substances (toxines) which act upon the tissues of the body cannot be denied. We know that, independently of organisms, cells, both in animals and man, possess the power of producing chemical products which react upon the metabolism of the tissue. All that takes place within the body is closely associated with cell-action, and that this action is purely a chemical one is beyond question. The details of the normal tissue-changes and the chemistry of the action of the cells we do not understand sufficiently to be conversant with their pathological changes. We see only the results of these abnormal changes, but do not know their source nor nature.

We include here the epithelial cancers (flat and cylindrical celled), the carcinoma simplex, and the scirrhus and the alveolar carcinoma.

In the sarcomata we include the spindle-, round-, giant-, and mixed-celled sarcomata, the melanosarcoma, the endothelial sarcoma, and the lymphosarcoma. The varieties of carcinoma, as of sarcoma, depend upon the nature of the parent tissue from which they originate, and it is our duty to investigate the character, shape, and arrangement of the cells, in so far as they give us a definite idea of the probable origin of the growth, and its method of extension along or into the lymphatic spaces, lymphatics, the veins, and the ducts of glands.

The morphological and physiological properties of the cells of malignant tumors are very different from those of the mother cells, and it is again demanded of us to inquire into the nature of the agent or agents which impart to the cells these new properties.

Our right to place the malignant tumors among the disturbances of nutrition is quite as tenable as to consider syphilis, malignant lymphoma, leukæmia, and pseudo-leukæmia in the same class. In neither is the cause known, and in all the supposition is that the agent producing them is the result of cellular action, with the development of leucomaines or ptomaines.

With the continued investigations in the study of our so-called tumors, I believe that surgery is destined to be relieved of the nomenclature and classification which we now employ, and a classification in which the primary cause will be the criterion will place our tumors:

(1) As the results of traumatism.

(2) As the results of inflammatory processes, especially those followed by cicatrization and ulceration,—*i.e.*, a local disturbance in the nutrition of a part.

(3) As the results of congenital anomalies.

(4) As the results of disturbances in nutrition, due to toxins, chemical or possibly parasitic, developed most frequently upon a soil prepared by traumatism, inflammation, or a sequestral anomaly.

The observations made and the deductions drawn from them in this paper are such as have impressed themselves upon me in an attempt to combine the pre- and postoperative clinical history of tumors with the macroscopical and microscopical reports of the pathologist. Though I may be completely in error, I nevertheless, in order to develop an interest in the subject, give my views in reference to tumors or neoplasms, using the term as it is employed in our surgical works.

REFERENCES.

¹ The "vestige" is a remnant of an organ functional in vertebrates lower than man, of an organ important to the embryo, but useless to man, of an organ utilized in one sex and not in the other, and of structures useful to our progenitors, but not in any distinct or existing vertebrate, mesonephros,—Gärtner's parovarium, etc. A "rest" refers to a detached fragment of a gland or isolated portions of a tissue or epithelium, as the accessory thyroids, adrenal implantations in the kidney and broad ligament, etc.

² Multiple cartilaginous exostoses and enchondromata represent a disease of itself, and is due to a disturbance in the intermediary cartilage from an original failure in perfect growth based upon nutritive disturbances in the bones involved, and in the rest of the skeleton as well. Bessel-Hagen first referred to the general skeletal changes, and Nasse and von Bergmann have substantiated it.

³ Lipomata, multiple and symmetrical, as well as neuromata, multiple and symmetrical, when not congenital (at least, where no data to that effect exist), are considered trophoneurotic. Should these facts be true, these conditions would be placed among the disturbances in nutrition, due to trophic influence, and not considered as the result of congenital defects in perfect growth.

CONTRIBUTION TO THE SURGERY OF THE PELVIS OF THE KIDNEY.¹

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THE literature of the operative surgery of the kidney is replete with histories of cases that have baffled the most experienced operators, and although the inestimable advantages of aseptic surgery have inaugurated the institution of explorations that were not considered proper in the preceding period, there can be no doubt that much remains to be done in this department.

Even now, when the searching scrutiny of the pathologist has forced nature to yield many of the deviations of her natural secret processes, history affords ample illustrations of the almost insuperable difficulties with which the clinician has frequently to contend, and the mortification which he has often to endure in his operative work. When confronted with conditions other than those predicted at the bedside, these revelations have undoubtedly added to our store of knowledge, and by their accumulation have made possible many of the most brilliant achievements in modern surgery.

The safety with which such explorations are now made on the living subject, may probably have led to their too frequent use, and their fascination may have induced the enterprising operator to neglect the time and pains that in times gone by would have been taken to establish a previous diagnosis, such procedures on the living only too often fail to throw light on the obscurer cases, and are only warranted when the physician has used up all the resources of his art,

¹ Read before the New York Surgical Society, December 8, 1897.

then, and then only, is it the province of the surgeon to expose the parts to view.

Confining ourselves to the interesting subject of the present paper, it may be proper to insist that it in no way detracts from the value of an operation, when we fail to find what we had expected. In those done for exposing the kidney and its pelvis, as quoted by Henry Morris in 1884, there was a record of twenty-four operations for stone, where none was found. Referring to the difficulties occasionally encountered in such cases, the same author cites a case of Knowsley Thornton in which the symptoms pointed to the presence of calculus in one kidney and in which the combined operation through abdomen and loin proved its existence in the other. Such cases could be multiplied to a wearisome extent, and they are not alluded to for the purpose of extenuating the error in the diagnosis of the first case reported in this communication, because in it there were found lesions that could not possibly have been made out without exploration. The following history is drawn from the records of the hospital:

I. C., aged twenty-two years, single, stonecutter, United States, on admission gave the following account of himself: Has been a man of temperate habits, never any evidence of rheumatism, malaria, syphilis, tuberculosis, or gonorrhœa; has always enjoyed good health excepting the complaint for which he seeks relief, which began four years ago, and consisted in paroxysms of severe pain, principally in the lumbar region, vomiting, and slight disturbance of micturition; each paroxysm had been preceded by a chill, headache, constipation, and a coated tongue. Four or five hours after the chill he is seized with vomiting and severe pain, which is situate behind in the right lumbar region, and gradually passes around to the front of the abdomen downward, terminating near the umbilicus. The pain has never passed down into the inguinal region, nor has there ever been retraction of the testicle. The pain is so severe as to double him up at times, and is accompanied by severe vomiting of all ingesta, lasting through the attack, micturition is difficult, and the urine

seems diminished in amount, but he has never passed gravel or blood, nor suffered from sudden stoppage of the flow. During the first year the paroxysms came at intervals of about two months, and lasted from eight to ten hours. They have gradually increased in frequency, duration, and severity, and during the past year they have occurred nearly twice a week, and have lasted about thirty-six hours. No treatment has had any effect upon them but the administration of morphine.

His last attack began in the evening of August 23, the day before he was admitted to the Medical Division of the hospital, service of Dr. Tuttle, under whose careful and painstaking observation he remained for eleven days. During this time he had two attacks of severe pain, relieved only by the hypodermic administration of morphine. Repeated examination of the urine showed it to be slightly alkaline, with some amorphous phosphates, but no blood, pus, or casts.

On admission, palpation revealed an indistinct enlargement of the right kidney, which was also tender; the swelling, however, rapidly disappeared, and could not be recognized again. A diagnosis of probable renal calculus was made, and an operation advised, to which the patient readily consented, being willing to submit to anything that offered a possible chance of relief to his suffering. Accordingly, on September 4, he was transferred to the Surgical Division, where he was under observation for four days, in which time he had one attack, which resembled, in all its features, those which had been noted before.

September 8, after the usual preliminary preparation, ether was administered; patient was placed in the ventral position, with a moderate-sized sand-bag under the lower abdomen to enlarge the ileo-costal space, incision posteriorly four inches to the right of the vertebral spinal processes, vertical, reaching from just below the twelfth rib to the crest of the ilium, along the outer border of the erector spinæ, lumbar aponeurosis exposed and divided, disclosing quadratus lumborum and perirenal fat, which was separated sufficiently to expose the whole kidney in front as well as behind. In appearance it was perfectly normal, and palpation between the four fingers in front and the thumb applied to its posterior surface detected absolutely nothing. The pelvis of the kidney was next exposed by pressing away the fat from its posterior surface, when it ballooned up into the wound, dilated up

to about the size of a small lime, its prominence and collapse being influenced by the movements of respiration, its walls, bluish-gray in color, resembled somewhat the tense walls of a small ovarian cyst. The ureter, which was considered to be slightly larger than normal, and its implantation into the hilum a little above the centre, was somewhat obscured by the dilated pelvis bulging over it, but the slightest pressure of the finger sufficed to press this away and exhibit its communication with the pelvis. The ureter was traced down for several inches, and no stone found. The pelvis was then opened by a longitudinal incision one and a quarter inches in length, giving exit to about one ounce of clear urine. A finger, introduced through this opening, could pass freely into all the calyces with negative result, the walls of the pelvis only moderately thickened. A vertebrated probe was then passed down the ureter to its entrance into the bladder, and upon its withdrawal an elastic catheter No. 10 French was readily passed into the bladder, giving exit to urine. No calculus was found, and in the absence of any other obstruction, unless the bulging of the lower half of the pelvis could be considered such, the incision in the hilum was closed by a fine continuous catgut suture, the remainder of the wound being closed around an iodoform gauze drain, the patient leaving the table in excellent condition.

The next morning after the operation the patient had a slight attack of pain resembling his previous ones, which lasted only one hour, and this was the only attack he had subsequent to the operation. Convalescence was uneventful, at no time was there any evidence of leakage of urine. For four or five days there was a free discharge of blood serum, which required a daily change of the superficial gauze; the drain was changed on the fifth day, and a shorter one used; on the tenth day it was removed entirely. He was allowed to get up on the fourteenth day, and left the hospital on the 20th day of September, cured. I saw him again on the 1st day of November and on the 8th day of December and he had suffered no return of pain.

Remarks.—This patient was in the Medical Department of the hospital during two of his paroxysms, and very careful observations were made to differentiate between nephrolithiasis and cholelithiasis; the pain always began in the right

lumbar region, passing around to the front, nearly to the umbilicus, to the right of which A. W. Mayo Robson states that there is always a tender point to be found in the latter affection when associated with gall-bladder inflammation. This tender spot is to be found at the junction of the upper two-thirds, with the lower third of a line drawn from the ninth rib to the umbilicus, the pain in this instance radiated in this direction and not downward to the inguinal region; he had never noticed retraction of his testicle, nor had he ever passed blood in his urine. These conditions warranted a careful consideration of the possibility of the attacks being due to the passage of calculi, blood-clots, inspissated mucus, or bile through the cystic duct: there had been no evidence of obstruction in the common duct, he had never exhibited any symptoms of obstructive jaundice. On the other hand, the pain always began in the lumbar region, which was very sensitive to pressure, especially to a sudden tap, and had always been associated with or followed by difficulty in micturition. During one of the attacks that were observed in the Medical Ward, it was thought that there was slight enlargement of the kidney, but this was not found on any subsequent occasion, and the repeated and careful analyses of urine were negative, unless its slightly alkaline condition could be considered an element in diagnosis. After a careful consideration of all these facts there existed no hesitation in accepting the judgment of the physician in charge, that the case was one of renal colic and probably due to stone.

The conditions found on exposing the kidney, though not entirely satisfactory in confirmation of the diagnosis, were extremely interesting, and though familiar with the admirable paper on the surgery of the ureter, by Christian Fenger, of Chicago, and that of Mynter, of Buffalo, on valvular distortions of the same, I could scarcely satisfy myself that the dilatation of the pelvis was sufficient to cause obstruction. It was noticed that the lower part of that cavity was more dilated than the upper, making it appear as if the ureteral

implantation was higher than normal. In passing the catheter I found it necessary to direct its point upward so as to engage its point in the ureter, and then had no difficulty by rotating the instrument on its transverse axis in introducing it into and through the canal, it evidently had to surmount a ridge formed by the bulging of the lower half of the pelvis. Still the obstruction, if this condition really constituted one, was apparently so slight that I was not prepared to accept it as a causative agent at that time, realizing, however, that in the future an increase in the dilatation might cause one of those valvular conditions described by the authors previously referred to. Of course it is possible a calculus might have passed during the attack of the previous day, or that one engaged in the ureter might have been pushed into the bladder by the catheter, but the facility with which that instrument passed would preclude any such conclusion, and no evidence of it having passed into or out of the bladder was obtained. With considerable misgiving as to whether I had found the real cause of these attacks, I closed the opening in the pelvis with a fine continuous gut suture, bringing the remainder of the wound together around a drain.

I must confess that I was very much and agreeably surprised at the result in this case, as I was not prepared to expect it. On the morning following the operation he had an attack of pain resembling his old ones, but lasting only one hour, and in all probability due to the passage of a small clot of blood, since which he has been absolutely free from pain.

There was no difficulty whatever in suturing the wound in the pelvis, and there was no leakage from it.

Intermittent Hydronephrosis. Plastic Operation on Pelvic Origin of Ureter.—F. G., aged seventeen years; school-girl. History negative up to six years ago, when she began to have attacks of pain in the right lumbar region. She has had from two to three attacks each year for three years. These attacks generally came on when she was up and about, and confined her to bed for about three days. The pain was not very severe

and always subsided after application of heat. Menstruation has always been normal. Has been constipated for a long time past. One year ago she was sick one month with what her physician says was *faecal* impaction. During the past eight months she has had three attacks of pain in the right lumbar region, associated with the appearance of a tumor, which always disappeared with the pain after a short time. The first attack began April 15, 1897, on which day she was admitted into the Presbyterian Hospital. The pain was situated midway between the right costal arch and crest of the ilium, about two inches to the outer side of the mammary line, and passed backward to the spine. It was constantly present, sharp in character, but of varying intensity. The pain at times "doubled her up" and caused sweating and chills. She vomited but once. On the second day of the attack a large, soft tumor appeared in the locality of the pain. The pain appeared to increase as the tumor became larger, and gradually abated as the tumor disappeared, about ten days later. Examination of the urine was negative. She was discharged April 26, with diagnosis of hydronephrosis. The second attack was two weeks ago. The pain was very slight; it appeared in the evening, and she felt a tumor as before. On the next morning both the tumor and pain disappeared. Noticed no increased amount of urine at the time the tumor disappeared. The present attack began November 28, one day previous to admission, with pain in the same locality as in the two previous attacks, and reappearance of the tumor. At no time has she ever been jaundiced. The pain has never radiated downward into the groin. There has never been any disturbance of urination. She has never observed any change in the quality or quantity of urine in connection with the appearance or disappearance of the lumbar tumor. On admission physical examination showed the patient to be well nourished, though slightly anæmic. Heart apex in fifth space, just inside mammary line. Apex-beat localized and forcible and regular. At apex is a harsh, very loud systolic murmur, transmitted around into axilla, heard all over præcordium and over back. Lungs are normal. Liver percusses from fourth space to free margin; edge not felt. Abdomen is not distended, occupying the middle of the right side of the abdomen; at level of umbilicus is felt a tumor about the size of a small cocoanut. Palpation shows the tumor to extend to the median line internally, and from level of

anterior superior iliac spine below to costal arch above. The tumor is tense, elastic, fluctuating, somewhat tender, and freely movable. Tumor is easily felt occupying the whole right lumbar region by bimanual palpation, an impulse being given to tumor in front is transmitted through tumor, and easily felt by hand behind. Percussion over tumor is dull with tympany between tumor and the liver edge. Operation December 1.

Vertical incision outside the erector spinæ, reaching from the last rib to near the crest of the ilium, the quadratus lumborum was drawn inward, bringing into view the vertebral aponeurosis, the division of which exposed the perirenal fat, which was displaced sufficiently to clear the surface of the kidney, which at this point was apparently healthy. Further blunt dissection brought plainly into view an enormously dilated pelvis. In the endeavor to find it a pretty tight band was found stretching across the ureter, about one inch and a half below its supposed termination. It looked like nerve tissue, and a small vessel could be felt pulsating within it. To expose the ureter below it was found necessary to divide this band between two ligatures; this freed the parts sufficiently to trace the somewhat convoluted canal up to its union with the pelvis. A longitudinal incision, one inch and a half long, was then made into the pelvis, giving exit to about twelve ounces of dark-colored urine. The finger introduced into this opening came everywhere in contact with the inner wall of a large sac, the extreme limits of which, however, could not be reached. All but one of the lower calyces were effaced; but the main distention appeared to be in the pelvis itself. The incision was held apart with blunt hooks sufficiently to expose the ureteral opening. The upper half of this was funnel-shaped, the lower half appeared to be valvular, the valve being formed by a spur-like eminence caused by the juxtaposition of the dilated pelvis and the ureter immediately below. No calculus was found anywhere; and to determine its absence in the ureter a catheter was passed through the pelvic opening into the bladder, giving exit to urine from that viscus. Supposing that the spur-formation was the initial obstruction, and that the stenosis was then increased by the occlusion caused by the dilated pelvis pressing upon the walls of the canal immediately below, a plastic operation was done. The spur was divided to the extent of three-quarters of an inch, and the margins of the incision were secured

by half a dozen gut sutures, the opening in the pelvis was then closed by a continuous suture of the same material. The kidney was anchored by passing three stout gut sutures through the capsule and parenchyma of the organ, the lumbar fascia and the overlying quadratus. A gauze drain was passed down to the line of sutures in the pelvis, and the upper portion of the superficial wound was closed.

Progress up to date, one week after the operation, has been extremely satisfactory. No disagreeable reaction; no pain; no refilling of sac, or reappearance of tumor. Gradual increase of secretion of urine and no escape of the latter from the wound.

THE OTHER KIDNEY IN CONTEMPLATED NEPHRECTOMY.¹

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WHEN nephrectomy is either contemplated or becomes a possibility in the course of any operation contemplated, a knowledge of the presence and condition of the other kidney becomes of prime and dominating importance.

A number of cases are on record in which a kidney removed by nephrectomy proved, after the necessarily resultant death of the patient, to be the only kidney the patient had ever possessed.

The writer, in his operative work, has met with several cases of single kidney. In none of these patients, fortunately, was there any indication for nephrectomy.

The presence of two kidneys can usually be determined by palpation. Mistakes, however, are possible in this connection. An enlarged gall-bladder has frequently been mistaken for a right kidney. The writer has himself committed this mistake in a case presenting a movable, kidney-shaped tumor in the right lumbar region. An exploratory lumbar incision proved the tumor to be a distended gall-bladder. Further exploration, moreover, established the complete absence of a right kidney.

Palpation, while *generally* to be relied upon to determine the presence of the kidney, *just as generally fails* to give us exact and satisfactory information of the condition of a kidney. It is nearly, or quite, impossible by palpation alone to diagnosticate a case of nephritis, or to determine from which

¹ Read before the Medical Society of the State of New York, January, 26, 1898.

kidney a renal hæmorrhage proceeds. A majority of cases of surgical kidney, multiple abscess of kidney, purulent nephropylitis and renal tuberculosis elude diagnosis by palpation alone. Many cases of tumor of the kidney, even, do not produce sufficient enlargement to be defined by palpation.

Visual inspection of the interior of the bladder and catheterization of the ureters give valuable aid in determining the presence and the condition of each kidney. Cystoscopy is a comparatively easy and, if aseptically carried out, safe procedure, both in the male and female, and should always be employed as a preliminary in contemplated nephrectomy. The results of cystoscopy, however, will not invariably prove completely satisfying. It may not always be possible to recognize distinctly *both* ureteral orifices. In that case a certain doubt must remain, first as to the presence of a second kidney, and secondly as to the character of its secretion, if present. Again, even if both ureteral orifices be distinctly seen, the result of watching them may prove misleading. Pus kidneys, especially cases of suppurative nephropylitis, may discharge their secretion into the bladder at very irregular intervals, and the result of inspection of the ureteral orifices, at any one or several times, may prove entirely negative. I have observed one instance in which an examination of the urine, made previous to operation, showed absolutely no albumen or pus; yet on operation I found and removed a kidney converted into a pus-sac twenty-three centimetres long and about eleven centimetres in diameter. In this particular case, indeed, occurring in the wife of a physician, pyuria had *at no time* been observed or even suspected. Even if we obtain pus from a kidney by ureteral catheterization we are still left completely in the dark as to the location and extent of the disease; whether it be a purulent nephropylitis, for example, or an abscess or abscesses in the substance proper of the kidney.

In renal hæmaturia, likewise, the results of inspection of the ureteral orifices by cystoscopy may be misleading. It may be that only one ureteral orifice can be distinctly recog-

nized. If bloody urine issue from that we cannot be sure that the other kidney is not also bleeding, or even that a second kidney is present. Or the confusing discovery may be made, as happened in one of my cases, seen and verified by my friend Dr. Howard A. Kelly, and elsewhere reported (*New York Journal of Gynecology and Obstetrics*, July, 1894, p. 36), that the bloody urine comes at one time from one and at another time from the other kidney. In this case the hæmaturia proceeded from the left kidney on one day and from the right kidney on the next. It proved to be a case of malarial nephrorrhagia, was promptly cured by quinine, and has remained cured. And finally, cystoscopy, although it may locate the bleeding in one or the other kidney, can give us no information regarding the nature of the lesion causing the renal hæmaturia.

Our next resource in determining the presence and condition of a kidney consists in collecting the urine from each kidney separately by means of catheterization of the ureters. This, in the male, is a comparatively new and difficult procedure, not certain always to succeed even in the hands of experts. In females the procedure is more readily carried out and more certain of result, owing chiefly to the possibility of direct cystoscopy in women.

Catheterization of the ureters, however, has its shortcomings, drawbacks, and contraindications which unfortunately greatly impair the usefulness and efficiency of what would otherwise be a nearly ideal method of obtaining information relative to the condition of each kidney taken by itself. I say *nearly* ideal, because in pyuria of renal origin it indicates neither the extent nor the exact seat, nor the multiplicity or otherwise, of the suppurative process, and in renal hæmaturia it tells us nothing of the lesion causing the hæmorrhage. Nay, in renal hæmaturia we may even be unable to decide by catheterization of the ureters as to which kidney is bleeding, since catheterization of the ureters often (one writer states in 50 per cent. of cases) itself causes bleeding from the ureters.

An important contraindication to catheterization of the ureters obtains in the relatively large class of cases of pyuria, and is based upon the danger of carrying infection from the bladder into a healthy ureter by means of the ureteral catheter. The same danger obtains in cases of unilateral renal or of vesical tuberculosis: a healthy ureter may be inoculated and the tuberculosis may ascend to a healthy kidney. This danger of infecting a healthy ureter and kidney is real and the responsibility for its risk must not be lightly assumed by any man.

Skiagraphy and the fluoroscope promise, in the near future, to enable us to learn much about the condition of the kidneys *intra vitam*. The presence and position of the kidney can be readily determined by the fluoroscope. In several cases in which I made the diagnosis of movable kidney by palpation, Dr. Samuel Lloyd has been able to verify the diagnosis by viewing the displaced kidneys with the fluoroscope, the patients, divested of part of their clothing, standing erect before him. Stones in the kidney have already been clearly skiagraphed, and it is quite possible that other lesions of the kidney, tumors, for instance, and even abscesses, will soon reveal to us their presence by means of the skiagraph and the fluoroscope. The difficulty, I imagine, will be to interpret correctly what we see with the fluoroscope and what the skiagraph pictures. Time, improvements in skiagraphy and the fluoroscope, and larger clinical experience, will no doubt solve many of these difficulties.

In the mean while there remains a final resource for determining the presence and the condition of the other kidney, any allusion to which in surgical literature has thus far escaped the writer, although he has heard of its having been recently resorted to, at least in part, by a prominent New York surgeon. *I refer to incision down upon, delivery, and examination of the fellow of the kidney to be removed, previous to completing an otherwise indicated nephrectomy.* On May 23, 1894, when I first practically carried out the idea, I believed the conception original with myself, and I have found no

reason up to the present to change this belief. As any claim to priority which I may have is based upon this case, I take the liberty of quoting briefly from its published report (Edebohls, "Notes on Movable Kidney and Nephrorrhaphy," Part III, *American Journal of Obstetrics*, February, 1895):

"A portion of the right kidney, four inches in length, was now brought to the bottom of the wound. It so greatly resembled the distended large intestine that for a time we were in doubt about its identity. It was finally identified by rolling it around and stripping off the perirenal fat until the ureter and renal vessels were recognized. The kidney itself, after coaxing it out upon the back, measured twenty-three centimetres in length, and was converted into a thin sac moderately distended with fluid. It was returned into the body to await the result of an exploratory incision upon the left kidney. The left kidney was found enlarged but otherwise healthy, evidently doing, and able to do, the work of both. It was anchored in the way described by the writer (*American Journal of the Medical Sciences*, March and April, 1893), and the left wound closed. Returning now to the right kidney, this organ, evidently degenerated beyond the possibility of repair, was removed without spilling a drop of its contents, the renal artery and vein, and the ureter being separately tied with silk. Iodoform gauze tamponade of wound. On examination after removal the right kidney was found distended into a huge sausage-shaped sac, the walls of which were everywhere as thin as the walls of the renal pelvis. This sac was filled with purulent urine having a decided ammoniacal odor."

Since the above case the writer has applied the method advocated in two additional cases, and has had occasion, in one further case, to regret his failure to apply it. The two cases in which it was applied were cases of nephrectomy for renal hæmaturia, in which the hæmorrhage, by its copiousness in one and its long continuance in the other patient, threatened life, and in both of which all known measures to control the bleeding had been tried and had failed. In both of these cases, after exposure, delivery, and examination of

the bleeding kidney, and before its removal, the opposite kidney was also exposed by incision, delivered, examined, and found to be healthy and not bleeding. In these cases the exploration of both kidneys, the nephrectomy, and closure of both wounds for primary union (which was obtained in all four wounds) required sixty and seventy minutes respectively.

The instance in which the writer had occasion to regret a nephrectomy performed without such exploration of the other kidney was in a case of surgical kidney. The patient was in a very feeble and precarious condition, and the enlarged right kidney, riddled with innumerable abscesses of all sizes, was hurriedly removed without exploration of the left kidney. On the death of the patient, two days after operation, the left kidney was found to be as badly disorganized by multiple abscesses as was the right. The result would, of course, have been the same as far as the patient's life was concerned, still the nephrectomy was unnecessary, and would not have been performed had I known the condition of the other kidney.

Modern surgery, with improvements in methods, techniques, and appliances, has made exploratory incision, eversion, and examination of the kidney a perfectly safe procedure, and one that can be expeditiously carried out. At a time when more ancient methods prevailed, when it was necessary to change the position of the patient and sterilize a new skin area before the other kidney could be approached, when it was an arduous task to deliver the kidney through the incision, when the incision itself was generally a complicated and serious matter, with additional incisions at right and oblique angles to widen the portal of approach, when the wound was usually packed and left to the slow and exhausting process of healing by granulation, the whole procedure was indeed a formidable affair, necessarily consumed a great deal of time, and imperilled the patient's chances of recovery.

With modern methods, presently to be outlined, exposure by incision, delivery and examination of both kidneys,

with nephrectomy on one side and closure of both wounds for primary union, need occupy no longer than sixty to seventy-five minutes, according to the difficulty of the particular case. With larger experience this time-allowance will, in all probability, be considerably reduced.

Previous to October, 1892, the date of the writer's first bilateral nephropexy, operations upon both kidneys *at the same sitting* were extremely rare, the only recorded instance which I have been able to find being a bilateral nephropexy performed by Küster in 1883. Within the past five or six years, on the other hand, bilateral nephropexy at the same sitting has become exceedingly common, the writer personally having performed it no less than twenty-one times.

The following is the author's present method of procedure in contemplated nephrectomy:

(1) Place the patient prone upon the table, and cleanse the entire width of the back in the lumbar region so as to be ready to cut down upon both kidneys without the necessity of disinfection or change of position.

(2) Place the author's kidney air-cushion transversely across the table, underlying and supporting the patient's abdomen.

(3) Incise along the outer border of the erector spinæ muscle, the incision extending in a straight line from lower border of last rib to crest of ilium. Should the space between rib and ilium be unusually narrow, the incision is made a little more oblique, so that its lower end will reach the ilium a little outside of the lateral border of the erector spinæ. In no case should additional incision, at right or oblique angles to the first, with possible resection of a rib, as still so frequently practised by many surgeons, be made. The *absolute* necessity for such additions to the simple straight incision must be extremely rare. The writer has not encountered it once in nearly 150 lumbar incisions made for nephropexy, nephrotomy, nephrectomy, and exploration of the kidney; all of his kidney work has been done through the simple straight in-

cision. As the large incision is held to be justified by those who make it on the score of its necessity for examination and delivery of the kidney, I may add to the above statement that in at least 120 of my cases was the kidney completely delivered through the incision.

(4) Continue the first incision through the muscles and fascia of the abdominal parietes until the perirenal fat is reached. In cutting through the abdominal wall avoid injuring the large ilio-gluteal nerve. Its division is followed by postoperative pains and dysæsthesiæ in the upper and outer part of the gluteal region, of which patients complain bitterly, often for months after operation. The intact nerve can generally be hooked either outward or inward during delivery of the kidney. In three cases in which the nerve ran directly across the middle of the incision, and it was impossible to deliver the kidney either above or below the nerve, I have divided the latter, and, after returning the kidney, reunited the divided ends of the nerve by suture. In none of these three cases did the patients complain of the characteristic pain following solution of continuity of the ilio-gluteal nerve.

(5) Cut through the perirenal fat until the kidney is reached. Separate the kidney sufficiently from its connective tissue connections to permit of its delivery.

(6) Deliver the kidney through the lumbar incision. In case the kidney be distended with urine or pus, first draw off the fluid by aspiration to diminish bulk. At first I often experienced difficulty in delivering the kidney, until some years ago I hit upon the following method. With it delivery of the kidney, in nearly every instance, becomes a charmingly simple affair. An assistant, standing at the foot of the table, grasps the lower limbs of the patient and draws the patient towards him. In doing so the patient rolls along on the kidney cushion until the latter, instead of compressing the abdomen, comes to lie underneath the anterior surface of the lower half of the thorax. Compression of this portion of the thorax squeezes the kidney out from beneath the ribs,

causing it to present fully in the wound. With a little more or less assistance on the part of the operator, sometimes, indeed, without any assistance whatsoever, except the above manœuvre, complete delivery of the kidney is effected.

In the two instances of renal hæmorrhage above related I laid both kidneys simultaneously side by side upon the skin of the back for more careful comparative study.

(7) Palpation of every part of the kidney, of its pelvis, and of a greater or less length of ureter can now be performed. If indicated, any of the necessary operations upon the kidney, puncture, nephrotomy, exploratory or therapeutic, nephrolithotomy, resection of the kidney, etc., can be carried out. If a conservative operation be performed upon one kidney, exploration of the other kidney is not called for. Nephrectomy is easily performed by tying the renal vessels and ureter separately with forty-day catgut and cutting the kidney away.

(8) After completion of examination or of operation, except nephrectomy, the kidney is returned within the abdomen. If a healthy kidney have been found movable prior to operation, nephropexy should be performed. Unless drainage of the interior of the kidney be called for, or the wound surfaces have been soiled by infectious matter, full closure of the lumbar incision for primary union, without drainage, should be the rule. This rule holds good for both incisions, the nephrectomy as well as the exploratory. The writer closes the deep layers of the wound, the abdominal parietes proper, with buried sutures of forty-day catgut, and the skin with the subcuticular suture.

The patient is out of bed by the tenth day, even after nephrectomy. The danger of hernia in this region, with the above form of incision, is practically *nil*. The writer has never seen a hernia in this region in his own practice, and the only case he knows of is one reported by Boldt as following a nephropexy.

For ascertaining the condition of a kidney, as well as obtaining assurance of its presence, lumbar exploratory inci-

sion possesses advantages, in positiveness and exactitude of resultant information, over examination of the urine, palpation of the kidney, cystoscopy, ureteral catheterization, skiagraphy, and the fluoroscope, while its risks and drawbacks, under modern methods, are scarcely greater than those of catheterization of the ureters. This holds especially true in pus and tuberculosis cases, and when catheterization of the ureters has to be repeated, perhaps several times.

The information gleaned from inspection, palpation, puncture, and, if need be, exploratory incision of a kidney lying before the surgeon upon the back generally leaves very little to be guessed at. Slight or beginning inflammatory changes are the most difficult to recognize, while the more advanced stages of nephritis are easily determined by palpation and inspection. Traumatism of the kidney at once declare themselves. Aspiration will demonstrate the character of fluid collections in the pelvis or in the substance of the kidney. The appearance and feel of a surgical kidney are characteristic; if need be, an exploratory puncture will show the presence of pus. Stone in the pelvis or the calyces of the kidney can be readily recognized when the whole kidney can be grasped between the examining fingers; in case of doubt, a probatory puncture or even incision upon the suspected part is justifiable. Tumors of the kidney can be both seen and felt, and tuberculosis is easily recognized by the characteristic changes. A bleeding kidney, in addition to the spots of ecchymosis visible on the surface of the kidney, presents the telltale, deep-purple color of the renal pelvis. This optical phenomenon, which I have nowhere found described, is due to the presence of blood within the whitish-colored walls of the renal pelvis. It can be made to disappear temporarily by squeezing the blood out of the pelvis back towards the kidney.

Summary.—Before extirpating a kidney, a knowledge of the presence and condition of the other kidney becomes of paramount importance.

The aids to obtaining such knowledge are: examination

of the urine; palpation of the kidney; cystoscopy; catheterization of the ureters; skiagraphy; the fluoroscope; and, finally, exploratory incision.

The presence of a second kidney is determinable by most of these aids.

None of these aids, however, with the exception of the last mentioned, can, in all cases, give us completely satisfying information regarding the exact condition of the other kidney.

In cases of pyuria and tuberculosis of vesical or unilateral renal origin, catheterization of the ureters involves the risk of infection of a previously healthy ureter and kidney, and should be avoided.

Incision down upon, delivery, and examination of both kidneys (lumbar exploratory incision), as originally proposed and carried out by the writer, should be the rule in every contemplated nephrectomy in which we are not absolutely and beyond peradventure certain of the presence and exact condition of the other kidney.

Modern surgery, with improved methods and techniques, has rendered lumbar exploratory incision a safe and expeditious procedure, the most, and generally the only, reliable one for determining the exact condition of the other kidney.

A CONTRIBUTION TO THE SURGERY OF THE
SUPRARENAL CAPSULE, WITH REPORT
OF A SUCCESSFUL CASE OF ITS
REMOVAL.¹

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THE suprarenal capsule occupies a field that is still obscured and in darkness, in spite of the efforts of many explorers. Our knowledge of these glands, their physiology and pathology, is a mass of contradictions that leaves us in utter uncertainty. Any new observations should be accurately recorded that order may be brought out of this confusion. The following case presents some practical features that are instructive from a physiological, pathological, and a therapeutical stand-point. The case was referred to me by Dr. A. D. Nesbit, of Tekahma, Nebraska, to whom I am indebted for the history, which is as follows, viz.:

Mrs. C. B., aged twenty-four years; married; two children living, age of the youngest child twenty-two months; two miscarriages. About August 10, 1897, her attention was attracted to a sharp pain in the right side, below the costal arch and in the line of the nipple, extending downward towards the pelvis. Previous to feeling this pain she had experienced great languor, and was easily fatigued on exertion. She was naturally pale—

¹ Read before the Western Association of Surgeons and Gynecologists, at Denver, Col., December 28, 1897.

a family characteristic—and thin in flesh, consequently no marked wasting was noticed, but muscles were flabby and weak. She complained of gastric distress and occasionally vomiting. Dr. Nesbit was called to attend her August 25, 1897. On examination he found a tumor just below the right costal arch. This tumor had not been noticed by the patient. It was tender on pressure and movable, also marked tenderness over entire abdomen, with some tympanites. Tongue coated, bowels constipated, kidneys acting scantily, and urine highly colored, otherwise they seemed normal.

There existed great pallor of the skin with a peculiar color of the face and a marked weakness of the pulse. Temperature ranged from 100° to 102° F. for two weeks, when it fell below normal. Feet and legs were cold. This condition lasted until she was admitted to the hospital. The tumor in the mean while slowly increased in size. Her weakness and debility became more and more marked. Stomach trouble increased, so that she was unable to take but little nourishment. No family history of tuberculosis existed. She had six sisters and one brother living, who were all in good health. Father died at sixty-seven of stomach trouble. Mother living and in good health.

She was admitted to the Omaha Methodist Episcopal Hospital and Deaconess Home, September 10, 1897. On examination she was found to be of small stature, weight about 100 pounds. Panniculus adiposus slight, very anæmic, weak, and unable to stand. While the color of her body was very pale, her face and neck and the dorsal surfaces of her hands and wrists presented a moderate brownish, yellowish, bronzed appearance. The scleræ of both eyes were of a silvery color. Her tongue was broad, flabby, and pale, showing marginal dental indentations. A number of very small dark pigmentations in the inferior internal labial mucosa. Pulse 90, very weak, easily compressible. Temperature 102.6° F. Gastric irritation, some nausea, and nearly all foods causing distress. Bowels constipated. Urine normal in amount; specific gravity 1015; all chemical tests were negative. Lungs normal. Heart, aside from a very weak impulse, no organic lesions. Pelvic organs normal. Abdomen, on inspection, revealed slight tympanites. On palpation there was found an enlargement reaching from a point slightly external to the mammary line at the right costal arch and extending directly

downward about three inches; it had a breadth of about two inches. And, on bimanual palpation it could be moved slightly forward and backward and from side to side. It was tender on pressure, but otherwise caused no pain. It seemed to be located directly in contact with the abdominal wall, giving much doubt as to its exact nature, particularly was it difficult to decide from which organ it originated. It could have one of three origins, the gall-bladder, the hepatic colic flexure, or the right kidney. After examination on four successive days we were able to exclude, first, the gall-bladder, then the hepatic colic flexure, and then decided that we had to deal with an inflammatory process beginning about the kidney. After repeated urinary examinations, which always gave negative results, we believed that we had to deal with an extranephritic affection. Its exact nature we did not then determine, owing to the fact that we did not attach the importance to the bronzing of the skin, which was of moderate degree, and to the condition of the scleræ and labial mucosa that it deserved. The continually increasing asthenia, the progressive anæmia and emaciation, the unabated gastric irritation, the gradual increase of the tumor induced us to advise operative measures to relieve, and, if possible, to remove the depot of infection. To this the patient readily agreed.

On September 14, 1897, after the usual preparations, and under chloroform anæsthesia, an incision, beginning at the right costal arch, directly over the tumor, and extending about four inches directly downward, opening the peritoneal cavity, was made. The enlargement was found to be retroperitoneal. The peritoneum overlying it was incised and stripped from it. That portion of the peritoneum forming the inner margin of the retroperitoneal incision was caught by three hæmostatic forceps and drawn snugly upward against the abdominal wound so as to prevent the possible entrance of infection into the peritoneal cavity. We now found what proved to be a healthy kidney, and, overlying its upper fourth and extending upward about two and a half inches, a reddish, yellowish, cystic enlargement, closely adherent to the posterior parietal wall and the lower part of the diaphragm and the posterior surface of the liver, reaching downward and involving the hilum, and more than one-half of the pelvis of the kidney. It was now not difficult to determine that we had to deal with a pathologic suprarenal capsule. A second

incision, beginning in the middle of the first and extending outward two and a half inches, to give more room was made. It was not difficult to enucleate the adrenal, and at first we hoped to remove it and save the kidney, a procedure that could easily have been done had the pelvis of the kidney not been involved. It soon became apparent that to remove the adrenal and leave the kidney would mean a partial removal of the affected structures. While drawing the suprarenal capsule forward for more minute inspection it ruptured, and discharged a whitish, odorless fluid, mixed with a caseous substance, such as is found in tuberculous cavities. The nature of the affection now seemed clear. Believing we had to deal with adrenal tuberculosis, and recalling past unfavorable experiences, in the incomplete removal of tubercular structures in the genito-urinary tract, it was determined to remove the kidney. The renal vessels were found to be very short, the peritoneum was stripped from them, and each vessel was ligated separately, and divided, then the kidney and suprarenal capsule were enucleated. The resulting cavity was carefully cleansed, flushed, dried, and dusted with iodoform. The retroperitoneal wound was then closed with a running catgut suture. The T-shaped parietal wound was closed, continuous catgut for the peritoneum, silkworm gut for the muscles and integument, and a continuous coaptation catgut for the skin margins, an iodoform gauze drain was placed in the outer end of the transverse incision. Hygroscopic antiseptic dressing completed the operation. The healing process was uneventful. The temperature fell to normal in thirty-six hours, and remained so. Nutrition was carried on per rectum about two days, when the gastric distress gradually subsided. In three weeks she partook of regular diet.

The bronzing began to fade at the end of ten days, and had disappeared entirely in three weeks, her complexion becoming very clear. Her lips became pink, her cheeks rosy, and the pigmentation of the labial mucosa disappeared. The pearly hue of the scleræ vanished. The heart became regular, the pulse stronger, the extreme languor decidedly less. She was discharged October 23, 1897, able to walk about the hospital, feeling cheerful and happy.

Report of microscopical examination of the adrenal, by Dr. W. R. Lavender. "A firm connective-tissue capsule, surround-

ing and forming cyst wall in which are no apparent vessels. Underneath this, approaching the centre of the gland, there are occasional elongated patches and lobules of adipose tissue, loosely arranged, pushing the tissue apart, some of these patches are partially, and others completely, surrounded by small round-celled infiltrations (leucocytic) of the adjoining connective tissue. The normal gland-cells are almost entirely replaced throughout the specimen by connective tissue, the elements of which show active proliferation loosely arranged, compared with the capsule. Glandular elements where present are in isolated areas, and undergoing coagulation necrosis; blood-vessels coats enormously thickened, and infiltrated with small round cells, in some cases the lumen is almost completely filled with proliferated endothelial cell elements. At irregular intervals, all through the specimen, are found more or less complete layers and patches of round cells in dense masses, central portions of which evidence degeneration by the *débris* present; at the margins of these round-celled areas, undergoing degeneration, an occasional giant cell is found. All through the newly formed connective tissue and replacing the glandular elements are numbers of polymorphonuclear leucocytes, with an occasional small patch of gland cells, hyaline and cheesy-looking in appearance; no nucleus demonstrable.

"A careful special double staining of specimens proved negative as to the presence of tubercle bacilli. From the general type, arrangement, and degenerated changes present in specimens a diagnosis of 'chronic diffuse inflammation,' probably tuberculous in origin, would be correct.

"In the absence of tubercle bacilli, which, if present, would be absolute evidence, the pathological factors found, being masses of small round cells, no vessels, centre degenerated and broken down, cheesy change in the glandular elements, infiltrations (leucocytic and fatty) in the connective tissue, changes in the vessel walls, both old and newly formed, in my opinion, favor 'tuberculous inflammation.'"

We know of no glandular organs in the body in reference to whose functions and pathology there exists so much discrepancy of opinion and such widely divergent views as the suprarenal capsules.

The adrenals are ductless glands and belong to a class under which are grouped the thymus and thyroid glands and the spleen. The adrenals are triangular-shaped, the left larger than the right; they are from one and one-fourth to two inches long, less in width, and only a few lines thick, and located on top of the kidney and behind the peritoneum. On section we find the glands to be composed of a cortical and medullary portion. The cortex is yellow and is composed of (1) the zona glomerulosa which contains closed vesicles; (2) the zona fasciculata, made up of cylinders in a stroma of connective tissues. We find some of their tubules to be opaque, containing finely granular cells and fat-globules. Some of them are brownish, made up of fine granular cells and fat-globules; and a third variety of gray tubules containing cells whose nuclei contain fat-globules; (3) the zona reticularis is made up of broken-up tubules and their contained elements.

The medulla consists of a reticular stroma filled with irregularly shaped cells. It is richly supplied with nerves which pass through the stroma. The blood-vessels of the adrenals are numerous, especially so in the cortex; they derive their supply from the suprarenal arteries which arise from each side of the aorta. Lymph-spaces permeate every part of the organ. The nerve-supply comes from the renal and solar plexuses, the splanchnic nerves are brought into relation with the nerve-supply through the solar plexus and its semilunar ganglia. The right pneumogastric nerve also terminates in the solar plexus. The suprarenal plexus is also joined by the phrenic nerves. The branches of this plexus are remarkably large for the bodies they supply.

We have made very little progress regarding our knowledge of the function of these organs since 1855, when Thomas Addison, of Guy's Hospital, published his first dissertation on the diseases of the suprarenal capsules. Dr. A. G. Auld, of Glasgow, believes that at least one function of the adrenals is to destroy a certain class of effete red corpuscles of the blood. He regards these bodies as in part excretory glands, and believes the symptoms of Addison's disease as "due to

an interference with these functions leading to the circulation of decomposing products of hæmoglobin and a tendency to pigmentary deposition." Dr. McMunn, of Wolverhampton, particularly concurs in these views in that he believes the "adrenals to be blood metabolizing glands." "They appear to remove from the circulation useless and worn-out pigments and their chief accompanying proteids." In other words, the adrenal, more particularly its cortex, is regarded as a sort of filter as well as a metabolizing structure. A disturbance of this function is believed to be responsible for the bronzing usually noticed in Addison's disease.

On the other hand, Dr. A. Rispal reported a case of Addison's disease in which the autopsy revealed a congenital absence of the suprarenal capsules, no other lesions were found. The patient was twenty-four years of age, the symptoms of Addison's disease, melanoderma, pains, wasting, cachexia, progressive asthenia, gastro-intestinal disturbances, proved fatal in ten months. (*Medical Record*, September 19, 1896, p. 422.)

Pal reports an interesting series of experiments in extirpation of the adrenals, tending to refute Jacobi's position, who believes that in them may be found the inhibitory centres for peristaltic movements. Pal concludes that the adrenals have no special importance for the life of the animal, even in dogs; that they cannot be regarded as inhibition centres for peristalsis; and that the only immediate effect of their extirpation is a severe disturbance of nutrition, which, however, the animal is capable of surviving. (*Wiener klinische Wochenschrift*, November 29, 1894; *Medical Record*, March 16, 1895.)

Abelos and Langlois have found (*Comptes-Rendus de la Société de Biologie*) that destruction of the adrenals in guinea-pigs, if complete, caused death by lowering the temperature and inanition. In their muscles was found a toxic substance that had a depressing effect upon animals. After grafting the glands into healthy rabbits, destruction of the normally situated organs did not cause death. They concluded that the adrenals destroy and neutralize some poisonous substance

engendered by the organism. Supino (*Archivios Italian de Biologie*) found that removal of the adrenals in rabbits did not cause death. The blood-serum of the acapsulated animals produced, however, a paralyzing effect on frogs. (Editorial *Medical Record*, September 30, 1897.)

Examples of this kind can be multiplied in great number, but these are sufficient to show that the etiological factors underlying Addison's disease are not dependent upon the presence or absence of the adrenals alone. Nor can we account for the bronzing or the progressive asthenia by the presence of adrenal disease alone. Dr. William G. Thompson (*Transactions of the Association of the American Physicians*, 1893) finds that the number of cases of Addison's disease reported up to date is 757. He, himself, reports six cases, three of them with autopsies. He found that in Addison's disease lesions of the adrenals are not always present. The lesion was absent in 12 per cent. of Lewin's 630 cases. Besides this, 112 cases of lesions of the adrenals without Addison's disease are collected. A case of Addison's disease is reported in which the disease was caused, apparently, by destruction of the left splanchnic nerve through pressure of an aneurism, the capsules being normal. He found that it was extremely difficult to remove them without causing serious surgical lesions, hence he destroyed them with a cautery. He found also that injections of glycerin and aqueous extract of the glands had no effect upon the healthy animal. He comes to the conclusion that Addison's disease is not due to a primary disease of the adrenals, but is more probably the result of irritation and disease of the abdominal sympathetic nerves and ganglia. (Editorial *Medical Record*, September 10, 1897.)

From the foregoing we are forced to search further than the adrenals to explain the clinical manifestations. We find Foa and Pellacani produced an aqueous extract of the adrenals which was capable of producing speedy death which was shown to be neurine. Drs. Marino-Zuco and Dutto (*Bull. di R. ac Med. di Roma*, November 4 and 5, 1891) regard Addison's disease as a slow intoxication process due to the

neurine which is no longer absorbed by the altered or destroyed adrenals. In the urine of a patient, tested daily, during the last twelve days of his life, they found the reaction acid; it contained no albumen or sugar. A noticeable quantity of indican was shown, and after a long and careful manipulation the presence of neurine was clearly demonstrated. Both suprarenal capsules were destroyed, and there was tuberculosis of both lungs. While neurine intoxication may often be one of the factors in the production of this symptom complex, yet it cannot be the important, nor one of the important ones. It does not at all assist us in clearing up the cases where there is an absence of the adrenals, nor those cases of adrenal disease without Addison's disease.

When we consider our case, we find that it seems to disprove the filtration and metabolic as well as the neurine intoxication theories as the sole explanation for the cause of the clinical picture. We had vomiting, pearly conjunctiva, asthenia, feeble heart, and gastric irritation, which all disappeared after the removal of the entire gland, the very organ which we are told separates the toxic neurine and other effete material from the blood. It would naturally follow that when the alleged adrenal function is abolished by its entire removal, that if any change occurs in the clinical picture, it certainly would be for the worse. One must assume that the adrenal would, for a long period, perform a part of its function, until the entire gland was destroyed, and one would look for a fatal termination only when entire disintegration of the gland had taken place. A removal of the gland would accomplish in a short period that for which the tubercular process requires a long time. Even assuming, in our case, that the left suprarenal capsule was normal, which was evidently true, by removing the right one whose entire function was, in all probability, not totally lost, we were reducing the excretory or secretory surface (whichever view we take of these glands as having an excretory or secretory function), thereby lessening the capacity of suprarenal activity, and since, in our case, the clinical appearance improved by re-

ducing rather than increasing adrenal function, we are compelled to look further in our endeavors to make clear the causative factors.

When we investigate the adrenal nerve-supply our attention is attracted to its unusually large nerve plexus, which is out of all proportion to the size of the gland, and stands through the medium of the adrenal plexus in intimate relation to the solar plexus and semilunar ganglia, and through these with the sympathetic nervous system. It has been affirmed by some (Wilkes, Greenhow, Arnand, and Alexis), and denied by others, that the nervous system plays an important *rôle* in producing Addison's disease. It has been shown that associated with advanced adrenal tuberculosis are often changes of the adjacent nerve plexuses, and that, on the other hand, the nerve-tracts seem normal. It seems, if it can be determined that lesions of important ganglia in intimate association with the adrenal nerve-supply produce some of the leading clinical manifestations found in Addison's disease, then we must admit that the nervous theory deserves an important place. "Experimental cutting of all the nervous connections of the suprarenal body does not give rise to the symptoms, produced either by its removal or by ligature of its efferent vein (Thirolloix), which are somewhat analogous to those of Addison's disease in men. "Experimental removal of the cœliac plexus (semilunar ganglia) leads to rapid emaciation, asthenia, low temperature, diminution of the amount of urea in the urine." (H. D. Ralleston, "System of Medicine," by Thomas Clifford Allbutt, Vol. iv.) This being true, we must consider that organs in state of disease, located so near the abdominal brain and in such close connection, can, by long-continued irritation of connecting nerve-branches produce such nutritive and nervous change as we have observed in Addison's disease. Our case strengthens this theory. As soon as the pathologic gland, the source of irritation, was removed, recovery ensued.

It has been said that the suprarenal capsules were beyond the reach of surgery. It would be more accurate to

say that if the diseases of the suprarenal capsule have not yet been brought within the reach of the surgeon, it is because we have failed to recognize adrenal disease early. As soon as we shall be in possession of positive signs that will enable us to determine adrenal disease early, I am sure that a technique will be developed that will make the surgery of these bodies no more difficult than the removal of a gall-stone from the common bile-duct.

It is absolutely necessary that adrenal disease be recognized early, before both adrenals are affected, for we are not often so fortunate as to find the disease so far advanced in one gland before the second is involved that it can be recognized by local signs. There can be no question that one gland becomes first infected, and its infection localized, for a considerable period before the second becomes involved; and if the primary depot can be treated surgically, or otherwise, we can hope for recovery. When both adrenals are involved, the most enterprising surgeon would scarcely have the hardihood to remove both glands, for experimental research has shown, at least, that total destruction of all adrenal structures will be followed by a fatal termination.

It has been shown that more than 80 per cent. of the diseases attacking the adrenals are due to tubercular infections, and it naturally follows, if we can learn to diagnose tuberculosis in its incipency, we may hope for successful treatment. Of late we see a shadow of hope in the microscopical examination of the blood. Very important contributions along this line have been made by A. Mansfield Holmes, of Denver (*Journal of the American Medical Association*, October 23, 1897, p. 832), wherein he says, "The first evidence, or at least one of the first evidences, gained from a study of the blood indicating that the bacilli have commenced active colonization, is a relative increase in the percentage of phagocytes, which I shall express by the term phagocytosis." If these investigations are confirmed, we will have at least one important sign, and by associating with this one, more accurate, until now unobserved yet existing, clinical data, we shall have made a great advance.

The removal of the adrenal gland is not so difficult. We have seen in our recorded case that a transperitoneal removal is feasible. Studies on the cadaver have shown that an extirpation can also be effected through the lumbar region. The removal of the eleventh and twelfth ribs will give ample room for purposes of attack. The avoidance of injury of the semilunar ganglia is of the utmost importance in an operative procedure.

It seems that the semilunar ganglia plays a *rôle* quite as important as the adrenal gland in the majority of cases. We may conclude that the primary seat of the disease is in the adrenal, the irritation is transmitted to the adjacent nerve-ganglia in some unknown way, producing unknown changes, which become manifest after a considerable time. If we can remove, or cure, the primary depot before anatomic nerve changes have taken place, then we may hope for recovery.

INTESTINAL OBSTRUCTION CAUSED BY MECKEL'S DIVERTICULUM.

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ACUTE intestinal obstruction resulting from a Meckel's diverticulum is so hard to diagnose, and the treatment, if operative procedures can be undertaken early enough, is so brilliantly successful that I wish to place the following two cases on record in order to increase our knowledge of this subject.

CASE I.—*Acute Strangulation of Ileum under a Bridge formed by Meckel's Diverticulum; Symptoms lasting Five Days; Operation; Death.*—On February 15, 1897, I was sent for to operate on a young man, aged twenty-nine years, suffering from acute intestinal obstruction. On my arrival there, late on Monday evening, I found the following state of affairs:

The previous Thursday afternoon, while in robust health, he was suddenly taken with severe griping pain in his belly. This became worse towards evening, when vomiting set in. The pain was not localized at any one spot, but was generalized over the abdomen. The following day he was seen by his physician, who prescribed calomel, which produced no evacuation, but increased the vomiting and pain. Purgatives of calomel and castor oil and enemata were given repeatedly, but no action of the bowels resulted. On Sunday the vomited matter became offensive, and the patient's condition grew decidedly worse. The purgatives were discontinued, and by the aid of morphine the patient passed a fairly comfortable night. He vomited repeatedly on Monday before my arrival, and each time the vomited matter was stercoraceous.

I found on my arrival that the patient was apparently comfortable, but complaining of paroxysms of colic coming on at intervals of ten or fifteen minutes. He complained of constant nausea, but there had been no actual vomiting for an hour before my arrival.

Examination of the abdomen revealed moderate distention with excessively tight abdominal walls. The abdomen was uniformly tympanitic, the liver dulness was fully two inches higher than normal, and there was slight difficulty in respiration. He complained of slight tenderness in the left flank only. No intestinal loops could be seen on the surface, although they had been evident on the previous Friday. On questioning the physician I found that waves of peristalsis had been very marked, and all seemed to cease at a spot a little below and to the right of the umbilicus. The temperature was 99° F. and the pulse 72.

I made a diagnosis of acute strangulation of the intestines, but the exact nature of the strangulation was in doubt. I advised immediate operation, but consent was given too late to operate that evening, as I was far in the country, with no nurse, and all the preparations to make myself. I gave the patient half a grain of morphine, and he passed a fair night, pain being but slight and vomiting occurring only once. The next morning, the patient being under chloroform, an incision about three inches long was made in the median line, part above and part below the umbilicus. Immensely distended bowels made their appearance at the opening, and were with the greatest difficulty prevented from protruding.

Two fingers were inserted into the abdominal cavity, and a careful but futile search made in every direction. At last I was forced to allow the intestines to come out of the cavity; they were received into warm towels, the incision was enlarged downward, and the search renewed. At last I found a piece of small intestine firmly fixed near the right iliac fossa, and, on following the loop to its fixation-point, the examining finger passed under a tight band. Careful traction succeeded in releasing the incarcerated intestine; it was deeply congested, almost black, but still retained its glistening peritoneal surface. It was very distended, but, compared with the enormously distended gut above, it appeared contracted. On retracting the right edge of the abdominal wound the band was exposed to view, and was found

to be a Meckel's diverticulum, with its free end attached to the base of the mesentery of the part of the ileum, from which it sprang. The diverticulum was short, stumpy, bifurcated at its free extremity, about one and a half inches long, one quarter of an inch in diameter, and it rose from the convex border of a portion of the ileum about two feet from the ileo-cæcal valve. From the apex of one of the apical horns a short thin cord ran to the base of the mesentery (almost over the right common iliac artery).

This cord contained an artery as large as one of the digital arteries, which, when ligatured and divided, pulsated forcibly. A ligature was placed on the cord, and the diverticulum was quickly amputated at its base, the opening into the ileum being closed by a continuous Lembert suture.

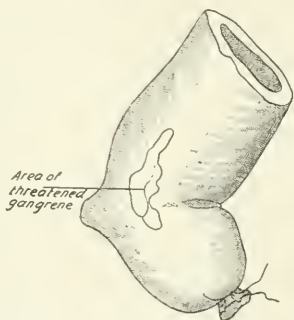


FIG. 1.—Showing diverticulum of ileum found in Case I.

Attention was now given to the intestines. The strangulated loop had rapidly filled with faecal matter, and seemed to be quickly recovering its normal color. An attempt was now made to replace the bowels, but it was soon found to be impossible without emptying the contents. An incision was now made into a distended coil and as many coils emptied through this as possible. This was then closed up with a Lembert suture, and another incision made into another coil. After this the bowels were carefully replaced, but even then a fair amount of pressure was necessary. After completely washing and cleansing the abdominal cavity a glass tube was inserted into the pelvis, the wound closed up, and the patient put to bed. The operation lasted an hour and a half. The shock was tremendous, as was to be expected. The pulse after the operation was 130 and

feeble; the surface of the body was cold and clammy. Hot enemata of brandy and water were given, and four successive doses of one-thirtieth of a grain of strychnine given in two hours. In about two hours he was conscious, and the pulse had fallen to 120, but he complained of intense pain. There was no nausea, and a little whiskey and water were given by the mouth. At 3 P.M. he became a little restless, but quieted under the influence of one-quarter of a grain of morphine. At 5 P.M. I was suddenly called and found him cold and almost pulseless. Strychnine was given and every means used to make him rally, but he gradually sank, dying the same evening at 9 P.M.

CASE II.—*Strangulated Inguinal Hernia (left); Prolonged Taxis; Rupture of the Gut; Diffuse Peritonitis; Death (Rupture at the Root of Meckel's Diverticulum).*—A. M., colored, aged fifty years, was admitted to the Sealy Hospital on August 10, 1897, complaining of some pain in his belly, and a history of having reduced on the previous day, by his own efforts, a left inguinal hernia of some years' standing. The hernia had been present ten years, had never been entirely reducible, but only gave trouble occasionally, when it increased in size after exertion. He had always been accustomed to partly reduce it with immediate relief of his symptoms; but on this occasion he had only succeeded after about three hours' hard work, and then the rupture had entirely disappeared. On admission his condition gave no cause for anxiety. Vomiting, which had been a prominent symptom while the hernia was in the scrotum, had ceased; there was only a little pain in the lower left part of the abdomen; the pulse was 85 and the temperature was normal.

During the day he seemed to be progressing favorably; no vomiting was noticed nor did he complain of pain. During the night serious symptoms appeared, and he was found in the morning with the abdomen somewhat swollen and tender, especially on the left side; vomiting spells at intervals of about half an hour; pulse 120 and temperature 101.2° F.

On my arrival he was taken to the operating-room and the hernial sac opened. A discharge of free fetid gas, intestinal contents, and semipurulent fluid followed. The sac was entirely empty and the internal ring free. The incision was prolonged into the groin and the abdominal wall divided above Poupart's ligament as far out as the anterior superior spine. Fæcal matter

and pus were evacuated in great quantities, and unsuccessful search was made for a perforation among the matted and inflamed intestines. The patient's condition becoming seriously weaker, the abdomen was cleaned out as well as possible and drained through a counter-opening made in the left loin. The patient never rallied, but died the same afternoon at 4 P.M.

A partial autopsy only was allowed through the operation wound. There was a generalized peritonitis, and the cause of the mischief was discovered in a perforation at the base of a Meckel diverticulum, which sprang from the ileum thirty-nine inches from the ileo-cæcal valve. At the base of the process was a rent about two centimetres long, opening completely into the alimentary canal. At the apex and along one side were evidences of old peritonitic adhesions which had probably bound it down firmly to the wall of the hernial sac.

To understand thoroughly the various conditions under which the diverticulum may be met with, it will be necessary to review its development, and particularly its relations to the omphalo-mesaraic vessels. The true Meckel diverticulum represents the vitelline duct, which extends from the primitive intestinal canal to the umbilical vesicle. In its most perfect form it extends from the lower part of the ileum to the umbilicus; opening freely into the lumen of the intestine, and at the navel being either open and allowing the escape of fæcal matter or completely closed. Its lumen may be obliterated in the greater part of its extent, and then the process exists as a solid cord, extending from the apex of the patent process to the umbilical cicatrix. This is by no means an uncommon condition, and when the solid cord is long and redundant, it may be thrown into loops through which portions of intestine may pass and become strangulated.

Oftener the diverticulum exists as a free tube arising from the ileum, lying in the peritoneal cavity without attachments, in which condition it is harmless, as, unlike the appendix vermiformis, true inflammatory affections due to retention of contents have been rarely met with. Fitz (*American Journal of the Medical Sciences*, July, 1884, p. 52) has only

been able to collect three cases of true inflammation around this process. One reported by Beale, where acute perforative peritonitis occurred; another by Houston, where adhesive peritonitis was noticed; and a third by Galton, where a perforation occurred from typhoid fever.

The attachment of the apex of the diverticle to different parts of the abdominal cavity opens up a very interesting subject. Most commonly it is met with attached to the base of the mesentery. Thus Cazin (*"Etudes sur les Diverticules de l'Intestin,"* Paris, 1862) gives ten mesenteric attachments out of twenty-three cases.

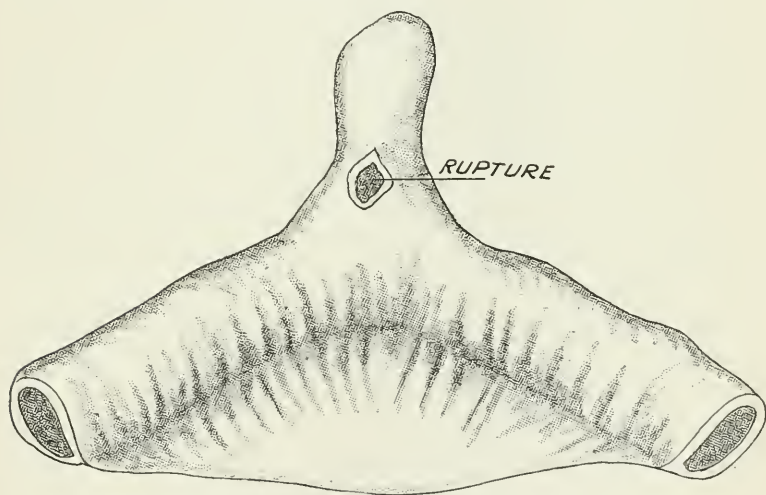


FIG. 2.—Showing diverticulum of ileum, with perforated base, found in Case II.

Treves (*"Intestinal Obstruction,"* p. 34) gives seven attachments to the mesentery out of nineteen additional cases collected by himself; and Kammerer (*ANNALS OF SURGERY*, August, 1897) quotes from the statistics of Boldt and those of Neumann supporting this statement; while from a review of the literature of the subject since 1890 he strengthens the position (*ANNALS OF SURGERY*, p. 185). Making a complete list from all the reported cases (sixty-six) Kammerer finds that the following represents the attachments: thirty-three to the mesentery; thirteen to the umbilicus; eight to the

abdominal walls; and twelve to the intestinal tract and other abdominal viscera.

My own two cases increase the list to sixty-eight, and give one attachment to the mesentery and one to the abdominal walls.

The preponderating number of attachments to the mesentery deserves some study, and suggests something more than mere coincidence. Occasionally, no doubt, the fibrous, cord-like attachment to the umbilicus becomes torn, and hangs free in the abdominal cavity until it becomes reattached to some of the contiguous viscera. This explanation will hold good in those cases where the apex is adherent to another coil of intestine or to the orifice of a hernial sac; but where the attachment is to the base of the mesentery, it does not represent a secondary adhesion, but is truly embryonic, and results from persistent omphalo-mesaraic vessels.

Treves ("Intestinal Obstruction," p. 34) speaks generally of these attachments of the diverticle to places other than the umbilicus as "secondary adhesions," but points out clearly that these *adhesions* are found more frequently in the mesentery of the ileum, between the origin of the process and the cæcum. Leichtenstern ("Ziemssen's Encyclopædia," Vol. vii, p. 535), in discussing this subject, quotes from Falk, and gives a diagram which probably explains the subject clearly. The explanation is the following: Along the vitelline duct course originally two omphalo-mesaraic arteries. The left one disappears, but the right remains as the superior mesenteric artery of the adult, the terminal branch of which accompanies the diverticle, if one persist, as far as the umbilicus. With the disappearance of the vitelline duct occurs a similar obliteration of the omphalo-mesaraic artery, but occasionally the duct may disappear and the vessel still remains coursing across the abdominal cavity from the root of the mesentery to the anterior abdominal wall as a solid cord having no connection with the intestine whatever. Such a case is described by Mahomed (*Transactions of the Pathological Society*, vol. xxvi, p. 117), where a fibrous cord was found passing from

the root of the mesentery about three feet from the ileo-cæcal valve, to the anterior abdominal wall, midway between the umbilicus and pubes. At its mesenteric attachment it was found to be continuous with the ileo-colic artery, and at its other extremity it divided into two parts, one passing down to the pubes, where it communicated with the superior vesical artery, the other passing to the umbilicus. An attempt to inject it from the branch of the ileo-colic artery succeeded to some extent through the mesenteric portion,

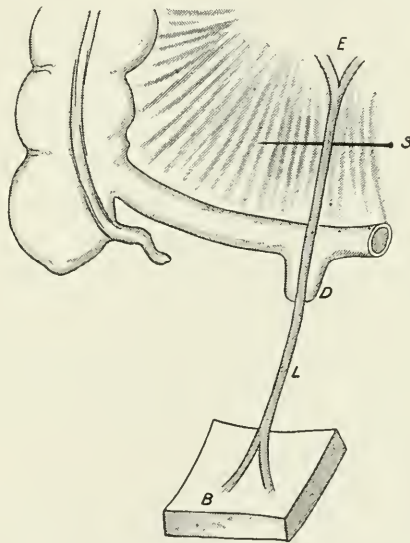


FIG. 3.—Diagram illustrating relation of persistent omphalo-mesaraic artery; *E*, root of mesentery, point of emergence of omphalo-mesenteric artery; *B*, umbilicus; *D*, diverticulum from ileum.

but the part in the abdomen remained impervious. (The cord had caused the death of the patient by snaring and strangulating a part of the small intestine.)

Meckel (Fitz, *American Journal of the Medical Sciences*, July, 1884, p. 43) describes intact omphalo-mesaraic vessels in the absence of a diverticulum in embryos older than ten weeks. Von Siebold and Schroeder found them very frequently in new-born cats and dogs. Allen explains the re-

tention of these vessels thus: By an adhesion of the yolk-sac and allantois an intercommunication is formed between the two sets of vessels, and this leads to the retention of the omphalo-mesaraic vessels long after the cessation of their primitive function. Where the omphalo-mesaraic artery undergoes obliteration from the apex of the diverticulum as far as the umbilicus, it may still course along-side the diverticulum from the apex of the process to the base of the mesentery of the portion of intestine from which the diverticle takes its origin. Also the diverticulum is sometimes provided with a distinct mesentery, and this probably represents a portion of the mesentery proper lifted up by the omphalo-mesaraic artery running in its free edge to the apex of the process. This mesentery in its most perfect form is triangular with the artery in its free edge, and it is quite possible to imagine that it could be penetrated or could atrophy with persistence of the vessel in the free edge, which would then show as a fibrous cord running from the apex of the process.

A glance at the diagram (No. 3) will explain this fully. E represents the root of the mesentery where the omphalo-mesenteric artery emerges from the peritoneum.

E D represents a cord containing the artery, D being on the apex of the diverticulum.

S is a needle placed under the cord, where a loop of intestine might also pass and become strangulated. L represents the cord free in the abdominal cavity passing from the apex of the diverticle, D, to the umbilicus, B.

Leichtenstern makes mention of certain congenital ligaments starting from the mesentery, very close to the intestine, at the usual height where diverticles are given off, and running upward towards the root of the mesentery to which they become attached. The ligaments are never hollow, but represent the obliterated vasa omphalo-mesaraica passing between the root of the mesentery and the intestine. This condition Falk has shown may remain until late periods of life.

In Case I the process E D remained intact and, curiously

enough, retained its artery with the lumen unobliterated, along which blood passed to the apex of the diverticulum. That the artery represented the omphalo-mesaraic it is impossible to affirm with absolute certainty, because we had no chance of tracing its connection with the termination of the superior mesenteric trunk; but, the cord in which it ran was entirely unlike any adventitious cord such as is met with in adhesive peritonitis, for it was smooth and covered with a shining peritoneal layer. Also its union with the posterior parietes was smooth and showed neither projection nor evidences of inflammation. From these facts I am convinced it was a foetal remain which could only have had the origin ascribed to it above. Specimens in the Warren Museum, described by Fitz (*loc. cit.*, p. 50), coincide absolutely with my own case. In both cases a dissection revealed branches of the mesenteric artery passing along the fibrous connection between the base of the mesentery and the apex of the diverticulum. An abstract of these cases will be instructive.

Specimen 496. Improvement collection, Warren Museum. Strangulation of intestine by means of a diverticulum. Process three and a half inches long arising from convex border of ileum. The end of the diverticulum shows no evidence of pre-existing peritonitis, but is continued directly to the upper surface of the mesentery by means of a gradually tapering cord one inch in length, varying in width from a quarter to an eighth of an inch. A branch of the mesenteric artery was dissected out and traced to the root of the mesentery, into the tapering cord, where it passed to the diverticulum. Its patency was demonstrated by the introduction of a fine probe.

Specimen 4831 of the museum collection. Diverticulum four inches long, arising from the ileum three feet from the ileo-cæcal valve, adherent at its blind extremity to the mesentery. The diverticulum arises from near the mesenteric attachment of the gut. Its distal end is dilated to the size of an English walnut, and is intimately connected to the mesentery without evidences of peritonitis. The mesenteric peritoneum is apparently continued directly over the diverticulum, at the distal end of which a considerable quantity of subperitoneal fat is present. The

mesenteric artery can be followed downward from near the root of the mesentery towards the attachment of the diverticulum. A branch of this was followed directly into the subperitoneal fat of the diverticulum, where it became too small to trace further.

Case II is, as far as I have been able to make out, quite unique.

Meckel's diverticulum has been found in the sac of a hernia many times. Thus Littré ("Intestinal Obstruction," p. 37), in the year 1700, found a diverticle four inches long in the sac of a scrotal hernia of a man aged forty-eight years. And Cazin described a diverticulum in a case of scrotal hernia dissected by himself. Also Tiedemann (Duplay and Reclus, "Traité de Chirurgie," Vol. vi, p. 768) found a diverticle in an umbilical hernia in a foetus at term; and Ludwig and Tilling have published a similar case. In the *Lancet*, 1896, Vol. i, p. 424, Mitchel Banks mentions having removed a diverticulum from the sac of a hernia which also contained small intestine. There can be no doubt in our case that the hernia was irreducible for some years, and was only reduced on the day before admission to hospital after prolonged exertion on the part of the patient, and the cause of irreducibility was probably due to adhesion of the diverticle to the wall of the sac. The diverticle is absolutely free from the suspicion of a terminal cord, but shows near its apex evidences of old adhesions. These are not analogous to those attaching the diverticle to the base of the mesentery, but are truly secondary, resulting from adhesive peritonitis.

A MODIFIED OPERATION FOR THE RADICAL CURE OF INGUINAL HERNIA.¹

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NONE of the operations thus far advocated and performed for the radical cure of inguinal hernia have impressed me very forcibly with their undoubted permanency of cure. It has fallen to my lot to have operated upon a large number of cases. In the majority of those I have been able to follow up the results have been satisfactory. I have, however, seen recurrences, not only in cases operated upon by myself but by other surgeons as well. The operations which were done in these cases were the Bassini and the Halsted. The point, in my experience, where the return (recurrence) first appears is at the upper end of the canal,—that is, at the site of the internal ring. In the normal condition the peritoneum at the site of the so-called internal abdominal ring presents the conspicuous depression known as the external inguinal fossa or, as it is sometimes styled, the hernial fossa. This is the point, as already stated, where recurrence first shows. Recurrence first showing itself at this point is a verification of the fact that this is a weak point in the inguinal canal. It has occurred to me, therefore, that equally as much, if not more, attention in the technique for the radical cure should be directed to this part of the anatomy. In both the Bassini and Halsted operations much stress is laid upon the obliteration of the inguinal canal and in making a new route for the cord, etc. I am of the opinion that this is important, but

¹ Read before the Philadelphia Academy of Surgery, December 6, 1897.

not more so than to get rid of the hernial fossa, which is not fully done by either of the operative procedures mentioned.

It is true that in the Halsted operation the hernial sac is cut off flush with the peritoneum to either side and within the internal abdominal ring, and the peritoneal wound closed after the manner of closing peritoneal wounds in abdominal work in general, yet I have felt that this can be improved upon by delivering the puckered hernial sac within the abdominal cavity after the manner of Macewen and anchoring it at the site of the internal abdominal ring.

Folding the sac after the manner of Macewen and delivering it into the abdomen can be done with a much greater degree of certainty and accuracy with the inguinal canal laid open.

The operation devised by Fowler, intraperitoneal transplantation of the spermatic cord, so far as advantageously disposing of the hernial fossa is concerned, is ingenious. I regard the total division of the posterior wall of the canal as a strong objection to this procedure. One of the strongest objections to any of the open operations for the radical cure of inguinal hernia is the division of that most important layer of the abdominal walls, the aponeurosis of the external oblique muscle. In addition to dividing the aponeurosis, Fowler cuts through the triangular ligament of the abdominal walls and the conjoined tendon, which, to my mind, is not a strong argument in favor of the procedure.

The most rational of the operations for the radical cure of inguinal hernia, not necessitating division of the external oblique aponeurosis, is the Macewen. Strong in that it does not divide the aponeurosis and in the obliteration of the hernial fossa. With all the improved technique, repair of the divided aponeurosis of the external oblique does not leave the aponeurosis as nature made it.

The operation, the subject of these remarks, is a modification of the open operations, combining the advantages of Macewen's operation. The hernial sac having been exposed by the division of the tissues constituting the anterior wall of the inguinal canal is separated throughout its entirety,

and a small opening made in it. The latter may not be necessary where the contents of the sac are reducible, yet to make sure that there are no adhesions which, if not separated and tied off close to their points of origin, may occasion subsequent trouble, this is done. In addition to separating the sac from the canal it is separated from the circumference of the abdominal aspect of the internal ring. It is now folded up and delivered within the abdomen, and anchored by means of a suture made to traverse the abdominal walls, which is tied down upon the aponeurosis of the external oblique.

The remaining part of the operation, that of closing the canal, is a modification of the Bassini and Halsted operations. The cord is held aside and the walls of the canal apposed with interrupted silver wire sutures introduced by means of the Reverdin needle. Commencing below, at the lower end of the wound and suturing upward, the aponeurosis, the anterior sheath of the rectus, the rectus, triangular ligaments of the abdominal walls, the conjoined tendon, transversalis fascia, and, finally, Poupart's ligament are transfixed with the needle and the suture placed. The second suture traverses the aponeurosis, conjoined tendon, transversalis fascia, and Poupart's ligament; the third, aponeurosis, the fibres of the internal oblique, transversalis, transversalis fascia, and Poupart's ligament; the fourth and fifth, as the case may be, the same structures as the third. Before these sutures are tied the edges of the divided aponeurosis are apposed by a continuous kangaroo-tendon suture, sufficient space being allowed at the upper part of the canal for the exit of the cord. The interrupted silver wire sutures are now tied, the cord placed in contact with the aponeurosis, and the skin and fascia brought together by either a subcuticular silver wire suture or interrupted worm-gut sutures.

The objection I have to the mattress suture is that it cuts the aponeurosis (Poupart's ligament) or the adjoining fascia lata, as the case may be, when tied. From my experience with the modified operation, I am of the opinion that it guards against a recurrence better than either the Bassini

or Halsted. What the operation devised by Fowler—that of placing the cord intraperitoneally, having previously divided all of the structures making the posterior wall or floor of the canal—will develop time alone will tell. I may remark that it is not practicable in all cases to free the hernial sac throughout, as where the lower portion of the sac is one with the tunica vaginalis, and this in turn is strongly adherent to the testicle. I have recorded a case of orchitis followed by breaking down of the testicle, general sepsis, and death following the liberation of a strongly adherent old hernial sac. Under these circumstances, I would advise the delivery into the abdomen of as much of the sac as can be safely detached.

In conclusion, I beg to say, that this modified procedure offers to my mind the best safeguard of the open operations against recurrence of hernia after the operation for radical cure.

FORCIBLE STRAIGHTENING OF THE SPINE IN POTT'S DISEASE, WITH REPORT OF CASE.¹

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THE essential features in the orthopædic treatment of tubercular affections of bones and joints are to prevent, as far as possible, motion, traumatism, pressure, and ultimate deformity. These requirements are more difficult to fulfil in connection with the spine than elsewhere, but, if anything, more essential. The best means at our command have heretofore been to place the patient in the recumbent position until acute symptoms have subsided, and then permit locomotion with the vertebral column supported in some appropriate manner. This meets the indications sufficiently in recent cases without deformity, but where destruction of the bodies of the vertebræ has taken place and kyphosis developed the method is deficient. It neither completely prevents pressure and rubbing of the diseased surfaces against each other, nor does it relieve deformity.

Calot,¹ of Berck-sur-Mer, has recently introduced a method of treatment which, although it antagonizes preconceived ideas, nevertheless deserves our careful attention. Instead of respecting the disfiguring hump, as we have been taught to do, he forcibly straightens the spine and endeavors to obtain a cure with little or no deformity. An excellent description of the procedure is given by A. Hoffa.¹⁶

¹ Presented at the Denver meeting of the Western Association of Surgeons and Gynecologists, December 28, 1897.

The patient, under an anæsthetic, is placed face downward upon a table. Two or three assistants make strong extension and counter-extension from the head and lower extremities. If two bands of muslin be used in making traction upon the head, one beneath the chin and one beneath the occiput, the bands may be included in the plaster dressing. When the extending force has been slowly raised to the desired point, which is not fixed, but should seldom exceed about 175 pounds, the operator applies increasing pressure with the balls of his thumbs upon each side of the projecting vertebral spines, assistants making counter-pressure from beneath. Considerable force is sometimes required, more than would at first be supposed either safe or desirable; but in recent cases, and occasionally in older ones, reduction is accomplished with surprising facility, extension alone at times being sufficient (Chipault²). The giving way of adhesions is usually perceptible to the touch and often to the ear, as in the mobilizing of ankylosed joints.

While the patient is still under the anæsthetic, Calot applies a plaster jacket over a layer of cotton; the back of the head, neck, and chin being included in the dressing, so that the face only remains exposed. Jones and Tubby¹⁰ employ a modified double Thomas splint, which they claim is more easily applied than plaster and is equally effective. The patient is not permitted to walk about until bony ankylosis of the affected vertebræ has taken place, which may often be demonstrated by a skiagraph.

Some surgeons (Nebel,⁴ in all cases, Jonnesco¹ when the deformity is slight) prefer to operate without an anæsthetic, deeming it preferable for the patient to endure the pain, which must often be intense, rather than run the risk of anæsthesia. There seems to be little reason to suppose, however, that chloroform or ether is much more dangerous than under other circumstances, and one or the other has been used in the majority of cases reported.

A number of operators (Jonnesco,¹ Jones and Tubby,³ Nebel,⁴ Vulpius,⁸ Redard¹) prefer to employ some form of

apparatus in producing extension rather than depend upon the hands of assistants. Intelligently directed muscular effort, however, seems preferable to any sort of machinery, as it is in many other surgical manipulations. O. Vulpius,⁸ of Heidelberg, suspends the patient above the table, face downward, the elbows alone resting on the surface beneath. This is accomplished by means of bands attached to the legs, and a Sayre apparatus applied to the head. It is claimed that reduction of the deformity and the application of a plaster jacket are thus accomplished with greater facility.

Hermann Nebel,⁴ of Frankfort-on-the-Main, employs an apparatus of his own invention, consisting of a sort of swinging bed, formed of cross strips of webbing, so arranged as to make pressure upon the portion of the body desired, while the patient lies face downward. In most instances, however, while adjusting the plaster jacket, the Sayre suspension apparatus has been employed in the usual way, either while the child was under chloroform or after the effects of the drug had disappeared. Suspension by the legs, with or without anæsthesia, is recommended by some.

A. Chipault^{2 11} insists upon the advisability, in aggravated cases, of cutting down upon and wiring together the spinous processes of the diseased vertebræ and the adjacent healthy ones, in order to add stability to the straightened spine. This seems unnecessary in most cases, although, perhaps, desirable in some. Chipault also employs wire in recent cases without deformity.

As regards the length of time in which the recumbent position should be retained, Nebel places it at a few days, and Vulpius at about eight weeks; but Calot insists that it should be longer than this, sometimes as much as eighteen months. It appears reasonable that patients should rather be left too long upon their backs than be permitted to get up too soon; that the time should in many instances be measured by months rather than weeks, if durable results are to be obtained. A well-fitting jacket or brace would, without doubt, permit comparatively early locomotion in many cases. The

duration of the treatment, as Calot remarks, depends largely upon the stage of the disease; if it is no longer active, the patient may often be discharged in four to eight months, but if the tubercular process is still progressive, from six months to one, two, or three years may be required to effect a cure, as is the case under other methods of treatment. If no inconvenience is occasioned, a single jacket may be worn three months or even five.

It is surprising how few dangers appear to attend forcible straightening of the spine. Out of about 600 cases, paralysis or death has occurred in but 1 per cent. (Calot¹⁰). The cord is almost never injured, although Lorenzi¹⁵ mentions an instance in which paresis of the bladder and lower extremities was apparently converted into complete paralysis, while two other cases of paralysis occurring in the first few weeks have been recorded; but it should not be forgotten that paralysis occurs anyhow in one-fifth of all cases. Vulpius noticed a single instance of temporary meningeal irritation. Investigations conducted upon dead children with Pott's disease have demonstrated that the membranes are seldom if ever torn.

When the spine is quickly and forcibly straightened, a gap is produced between the bodies of the vertebræ. This cavity is sometimes enormous, although varying in size according to the amount of bone which has been destroyed. In at least one specimen exhibited by Ménard⁶ in the Société de Chirurgie the fibrous wall limiting the focus was ruptured, admitting the tuberculous material to the mediastinum. Ménard and Watson Cheyne insist that strengthening arches and buttresses of new bone do not form in these cases, and that we cannot hope for the production of enough fibrous material of sufficient strength to prevent the recurrence of deformity; they advocate waiting until the ultimate results are obtained from the cases already treated. Calot, however, affirms that consolidation does take place in the majority of instances; by ankylosis, in moderately severe cases, of the bodies of the vertebræ, as well as the laminæ and transverse processes

and even the spinous processes. In the more extensive cases the posterior bony structures alone become consolidated. This he has demonstrated to his satisfaction by skiagraphs and specimens. If ankylosis should fail to appear within a reasonable time, say six to ten months, he recommends its artificial production by cutting down upon the laminæ, loosening the periosteum, and sliding it across the articulations. The operation should include several sound vertebræ on each side of the diseased ones. He suggests that this might even be done in many cases merely in the interests of prophylaxis, and it should always be done when recurrence takes place.

R. W. Murray¹² exhibited to the Clinical Society of London the spines of two individuals who had died of intercurrent maladies two and three months respectively after forcible straightening. A species of false joint existed in each case, without the slightest evidence of bony union. According to the statements of Calot, however, the time had been rather short for repair to take place.

The danger of causing meningitis is probably not greater than in breaking up ankylosed tubercular joints in general. Among 300 *redressements* made by Calot, during the first six months but four cases of tubercular broncho-pneumonia or tubercular meningitis occurred. In a recent discussion before the Société de Chirurgie,⁵ Reclus, Lannelongue, Broca, Brun, Quénu, and Jalaquier, all claimed that this danger has been greatly exaggerated; Lannelongue and Brun even maintaining that inflammation of the meninges occurs just as frequently when the cases were left to themselves. Jones and Tubby³ hold similar views. During the last eight years Kirmisson,⁵ however, has seen five cases of meningitis develop immediately after the breaking up of adhesions in tubercular joints, and he is accordingly opposed to such measures in most cases. Whatever the ultimate decision in the question, the fact remains that a few patients have succumbed to meningitis at greater or lesser intervals following the correction of spinal deformities.

It is asserted that Calot was not the first to forcibly straighten the spine in spondylitis, Chipault² and Sayre¹⁰ being among those who claim the distinction; but it cannot be denied that Calot originally employed the method extensively, and brought it into prominence. Some who preceded him attempted to attain the same end by slower means; while others (Langenbeck, Willett, Dick, and Hare) suspended the patient by the head and applied extension to the legs until the hump disappeared, one or two individuals unfortunately dying under the process. Manifestly neither of these methods is that of Calot. It is surely unjust to urge the death of these patients against the employment of Calot's procedure, as is done by Nebel. It is one thing to straighten a spine by an intelligent combination of extension and pressure, and quite another to hang a patient by the head and pull at his heels until the deformity gives way.

The general verdict has been that the cases in which Calot's method is applicable should be selected with care. Recent deformities are much more favorable than old ones where ankylosis has occurred. Where the hump is small the chances of accomplishing permanent improvement are better than when it is large. Nevertheless, a time-limit or a size-limit is very difficult to set. Old curvatures of large proportions have been successfully reduced, although the reduction is seldom complete, amounting generally to about three-fourths. Calot advises against operating upon patients of over twenty years of age in which the deformity has existed seven or eight years, especially if a force greater than from fifty to eighty kilogrammes is required; but if the age is under twenty, straightening may be accomplished, even if the hump has existed as long as ten years. In any instance, if a force of 100 kilogrammes fails, it is better to make an osteotomy on the posterior bony structures or even upon the bodies of the vertebræ. In some instances, even if the appearance of the back is but slightly bettered, the diseased surfaces may be relieved from mutual pressure, and the progress of the affection checked. In old cases it is often wise

to operate in several sittings, using but moderate force, and correcting but a portion of the kyphosis at a time. The sittings should not be longer than several weeks apart, so as to avoid the growth of new bony supports.

In very old, firmly ankylosed curvatures, it may be better not to interfere at all, unless it be merely to remove the vertebral spines, and thus lessen the prominence of the lump. Other contraindications are: the presence of marked cachexia, pulmonary or other complications, tubercular abscesses or sinuses, extensive deformities of the chest, etc.

The presence of cold abscesses is not a positive contraindication to operative interference, although their rupture into the vertebral canal might give rise to paralysis; but it is preferable to dispose of them first, if possible, perhaps by means of injections of iodoform. In Calot's cases, two abscesses followed *redressement*; but, on the other hand, several disappeared under similar conditions.

An interesting observation of Calot's is that out of eight cases complicated with paralysis, in six the paralytic symptoms disappeared within ten days.

Calot has reported nearly 300 cases with but two deaths and very few accidents of any kind.¹⁰ His statistics, which must be regarded as reliable, in absence of proof to the contrary, are certainly remarkable. Perhaps he has been peculiarly fortunate, as has happened to operators in other lines. The experiences of other surgeons have been favorable in the main.

Jonnesco, of Bucharest, reports thirteen cases, four of which died, the causes and times of death not being given.

Redard,^{1 13} of Paris, reports forty cases in which no disagreeable complications resulted. In all the general conditions improved, and the pains which were present ceased at once. In six, where deformity was marked, the spine became fixed in its new position; while in three a slight recurrence of the hump was found on removing the plaster cast at the end of two months. This was at once recorrected.

Robert Jones and A. H. Tubby³ report eleven cases with no immediate or remote bad results, the observations

extending over a period of four months. All were benefited, the deformity in even the old and pronounced cases being reduced at least three-fourths. In six, immediate and complete reduction was easily accomplished, two presenting extreme deformity. In a more recent article Jones and Tubby¹⁰ give their experience with twenty-five cases, while Jones is credited by Calot with sixty cases in all, with but one disaster. Five cases presented paralytic and paretic symptoms which at once improved. Ten complete and fifteen partial reductions were accomplished at the first sitting.

Hermann Nebel⁴ reports six cases operated upon without difficulty.

Brun⁶ reports two cases with recent deformity. Correction was easily accomplished.

Vulpius⁸ has had good success, even in old cases with marked kyphosis.

Michaux⁶ reports one case, with an old but small hump, but of such character that the patient was compelled to support himself while walking by placing his hands upon his knees. Straightening was easily accomplished.

Broca⁶ reports three cases, in which, although two presented no difficulties, the third resisted all efforts.

Helferich⁷ reports two satisfactory results in recent cases.

Hoffa¹⁰ reports thirty-six cases without accident, and Bilhout fifty cases with three deaths due to respiratory failure during manipulation.

R. W. Murray,¹⁰ of Liverpool, reports fourteen cases, including one of paralysis which underwent considerable improvement.

Jackson Clarke¹³ reports one case in which the result was unfavorable.

Cotterell¹³ reports two cases, in one of which the existing paralysis was benefited.

Phocas¹¹ reports twelve cases with satisfactory results.

John Ridlon, of Chicago, not long ago informed the writer that he had recently operated upon several cases with-

out accident. The immediate results, which were in the main favorable, have not yet been published.

To recapitulate. Theoretically the advantages of Calot's method are (1) immediate, complete or partial correction of deformity; (2) removal of pressure and irritation from the cord, resulting in some cases in relief from neuralgic and paralytic symptoms; (3) separation of the diseased surfaces of bone, thus avoiding pressure and irritation which are supposed to favor continuance and spread of disease; (4) gain in length of the spine; (5) avoidance of malformation of the chest walls and injurious alteration of the positions of organs.

The disadvantages which have been claimed are (1) production of a large cavity which may not fill up with sufficiently firm tissue; (2) non-formation of supporting masses of new bone and consequent weakness of the spine and recurrence of deformity; (3) rupture of tubercular material into the mediastinum; (4) increase of the disease by local injury, separation of fragments of bone, etc.; (5) production of tubercular meningitis, or of general tuberculosis; (6) injury to the cord or to its membranes; (7) production of abscesses.

Certain of these objections undoubtedly have weight, while others are more or less imaginary, or at least are not greater than are met with in the correction of deformities due to tuberculosis elsewhere in the body. Considering the number of cases already reported, and the favorable results obtained, we are certainly justified in operating upon reasonably recent cases with not too great deformity where but moderate force is required; and especially upon those with neuralgic or paralytic symptoms which do not tend towards improvement. The straightening process is, perhaps, more likely to relieve anterior pressure upon the cord than would a laminectomy. On the other hand, we must recognize that the method is yet in its experimental stage, and that we cannot speak with certainty as to the durability of its immediate achievements.

It is to be noted that forcible *redressement* in one sitting may be applied to deformities of the spine arising from causes

other than tuberculosis,—in ordinary scoliosis, in rachitic curvatures, etc. (Vulpinus,⁸ Calot,¹¹ and Noble Smith.¹⁴)

In the present state of our knowledge of Calot's operation, every experience, however limited, is of value; I therefore report the following case:

A well-developed, fairly well-nourished girl of eleven years, with no family history of tuberculosis, developed during the fall of 1896 a slight dorsal kyphosis, for which a plaster jacket was applied. The deformity gradually increased, until on October 7, 1897, there was a marked rounded prominence corresponding to the sixth, seventh, eighth, and ninth spinous processes, the seventh being more prominent than the others. There was throughout this time much girdle-pain felt in the abdomen, but there was little or no pain or tenderness in connection with the spine itself. When examined in October, percussion of the hump or a jarring blow upon the head produced no inconvenience whatever, and there was no muscular rigidity. About three months ago the child's appetite began to fail, and she lost considerable flesh. Five weeks ago a spastic gait developed, although it did not prevent free locomotion; but about one week after this control of the lower extremities was suddenly and completely lost, followed by severe shooting pains. The knee-jerks were found much increased on both sides, and the lower limbs paralyzed as regards motion, although sensation remained intact.

The child was admitted to St. Anthony's Hospital on October 8, 1897, and at once placed in bed, a plaster mould being accurately fitted to the back. She slowly grew worse, the girdle-pain increasing, until but little rest could be procured either night or day, the bowels and bladder being emptied with much difficulty and severe pain. At times catheterization was necessary. The matrix of a toe-nail upon the left foot became ulcerated so that the nail dropped off, and sensation disappeared from the peroneal region of the right leg.

On November 13 Calot's operation was undertaken. Dr. J. T. Eskridge, who was present, was so successful in hypnotizing the patient that an anæsthetic at first seemed to be unnecessary, but the pain soon became so excessive that chloroform was administered.

Extension and counter-extension were made from the head

and feet by three assistants, while a fourth pressed upward with the palms of his hands from beneath, the patient lying face downward. The operator made direct pressure upon the deformity by means of the thumbs placed upon either side of the vertebral spines. Considerable force was gradually exerted, the adhesions giving way and the spine straightening itself with an audible cracking and tearing noise. The kyphosis was reduced about three-fourths in size. Some difficulty was experienced in making sufficient continuous extension upon the head without interfering with the child's respiration.

The patient was then swung face downward in a muslin hammock, which increased the backward curvature of the spine, and the anæsthetic discontinued. A heavy plaster mould over a thick layer of cotton was applied to the back, neck, and head, and reinforced by a strip of sheet iron. A few turns of a plaster bandage about the chest and abdomen served to hold the cast in position.

Very little pain or discomfort followed the operation, but catheterization was necessary during thirty-six hours. On the second day the girdle-pain had entirely disappeared, and micturition and defecation soon became normal. The ulcerated toe healed so rapidly that it was practically well in three days, and sensation soon returned to the peroneal area. For perhaps a week spastic contracture of the lower limbs was marked, attempts at straightening being accompanied with severe pain; but this difficulty soon disappeared.

From the date of the operation the child's general condition rapidly improved, and in the course of several weeks a considerable gain in weight became apparent, but there was no return of motion. The prolonged dorsal position seemed to cause little discomfort.

At the end of about a month the patient began to lose ground. A superficial bed-sore appeared in the sacral region, and the general condition became less satisfactory. In a few more days it was noticed that sensation had become impaired over the lower part of the trunk and the extremities, and that the bed-sore had increased in size. It was evident that the good which had been accomplished by straightening the spine had been overcome by the disease. It was decided not to attempt further *redressement*, but to do a laminectomy instead. On open-

ing the spinal canal a mass of firm, tubercular tissue, which had worked its way around the left side of the cord, was found pressing upon that structure posteriorly and laterally, thus accounting for the recent sensory and trophic disturbances. It was plain that forcible straightening would probably have made matters worse instead of better. This new tissue was removed, the cord being laid bare for two or three inches. Union by first intention was obtained; but at the end of about two weeks a quantity of caseous and fluid tubercular material was discharged through the incision, probably from an abscess which had existed anteriorly. Prior to this occurrence there was no improvement, but subsequently to it the child has been slowly but steadily getting better, both as regards sensation and the control of the sphincters.

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CYSTOSCOPY AND CATHETERIZATION OF THE URETERS IN THE MALE.

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As previously stated in a brief preliminary note, published in the *ANNALS OF SURGERY*, January, 1898, I have insisted from the very first, when I began my work of inspecting the female bladder and catheterizing the ureters through an open speculum, that there was no reason why the same methods should not be applied, with few changes and slightly increased difficulties, to the male sex. Although I have repeatedly dwelt upon this in conversations with friends and during my cystoscopic demonstrations in women, I have not as yet been able to induce any one to take up the matter and to thoroughly investigate it.

Upon the 18th of November, 1893, I had a speculum made by Messrs. Arnold & Sons, of this city, eight millimetres in diameter, eighteen centimetres long, with a diminutive handle, like those made for my earliest female cystoscopes. I have never had a chance to use this speculum until recently, when opportunities have been afforded me in the genito-urinary clinic in the Johns Hopkins Hospital, under the care of Dr. Hugh H. Young, and at St. Luke's Hospital, New York, through the courtesy of Dr. L. B. Bangs and Robert Abbe. I have been ably assisted throughout in my studies and demonstrations by Dr. Otto G. Ramsay, resident gynæcologist in the Johns Hopkins Hospital.

It was at once demonstrated that the first speculum was longer than necessary, and that its calibre might even be made larger without the risk of injuring the average urethra.

The cystoscope I now use consists of an open cylindrical tube, eight millimetres in diameter, fifteen and a half centimetres long, with a funnel-shaped opening, twenty millimetres long, twenty-seven millimetres in diameter at its outer orifice, blackened on the inside and on the rim to avoid the reflection of the light. A stout handle, eleven centimetres long and twenty-five by twelve millimetres thick, is attached to the funnel, and affords a good grasp to the hand, enabling it to control the speculum perfectly. Other specula, a little larger than this, eight and a half and nine millimetres in diameter, are useful in cases with wider urethræ.

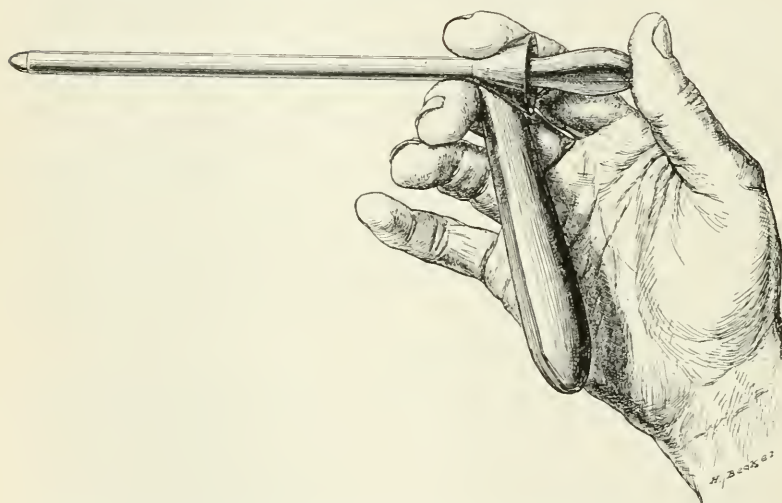


FIG. 1.—Showing male cystoscope reduced to a little less than one-half size ; it is held gently poised between index and middle fingers, and during its introduction the thumb keeps the obturator in place.

The end of the cystoscope which enters the bladder is rounded off so that it will not tend to cut the mucous membrane if it happens to be pushed against it; it must be made round enough not to cut, and yet not so round as to present a shoulder on the obturator; the thickness of the edge is about one-fifth or a sixth of a millimetre.

In introducing the cystoscope, it is grasped most conveniently as shown in Fig. 1, with the thumb pressing upon

the obturator to keep the inner end from pushing out of place during the introduction of the instrument into the bladder.

Held in the manner described with the cylinder, at the neck, just back of the handle and the funnel, with the handle directed downward, the cystoscope is poised easily between the last joint of the index-finger and the distal end of the

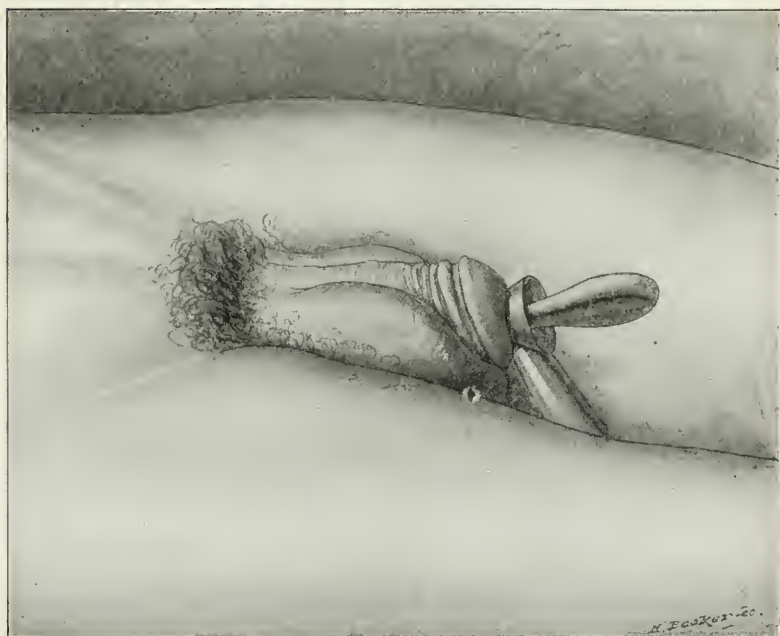


FIG. 2.—The cystoscope introduced with the patient in the dorsal position ; note particularly the shortening of the penis and the flattening of the glans, making it possible to use a shorter cystoscope. The obturator is left in place until the patient is in the knee-breast posture and the rectum is inflated with air.

second joint of the middle finger. After cleansing the urethral orifice and injecting a lubricant, the penis is taken in hand, and the end of the speculum introduced into the urethral orifice, and the instrument passed on up towards the triangular ligament, at the same time the organ is drawn up on the cylinder. When the point reaches the triangular liga-

ment the handle is dropped decidedly, as it is pushed on up into the prostatic portion; with a further drop of the handle, making a little decided pressure downward and backward, while pushing the speculum on up, it will often enter the bladder without any resistance. When, however, any resistance is encountered, it is better at once to oil the finger and introduce it into the rectum, and locate the point of the speculum at the neck of the bladder, then lifting up the end a little, while the right hand continues to make pressure, now under intelligent direction, the speculum at once slips in, as recognized by the freedom of the end and the readiness with which it glides on without resistance.

The patient is now aided in rolling over on his side, and then his face, and then in getting up on his hands and knees. This is managed by the assistants, while the surgeon is engaged in retaining the speculum in place.

In taking the knee-breast position it is important to see that he brings his chest close down to the table with the elbows spread out wide apart and the face turned sidewise, at the same time the thighs are vertical or slightly drawn up under the abdomen. If he is allowed to crouch or keeps his back arched, or to take any other of the numerous positions patients try to assume than the one just described, the examination will probably prove unsatisfactory, as the bladder will not distend with air.

I prefer in most cases introducing the speculum with the man in the knee-breast position; he takes the position easily and without the constraint occasioned by the presence of the instrument in his bladder; then the next step is to introduce a small speculum into the rectum to allow it to fill with air; if this is not done, the bladder expands so much that the base of it disappears up in the direction of the sacral hollow out of sight; by distending the rectum with air the base of the bladder drops down into the plane of vision and within easy reach of inspection. If the instrument is introduced with the patient in the knee-breast position, the reversed position of the organs must be borne in mind, the scrotum is lifted up

onto the perineum, while the penis is drawn over the instrument, and the handle is well elevated as it enters the

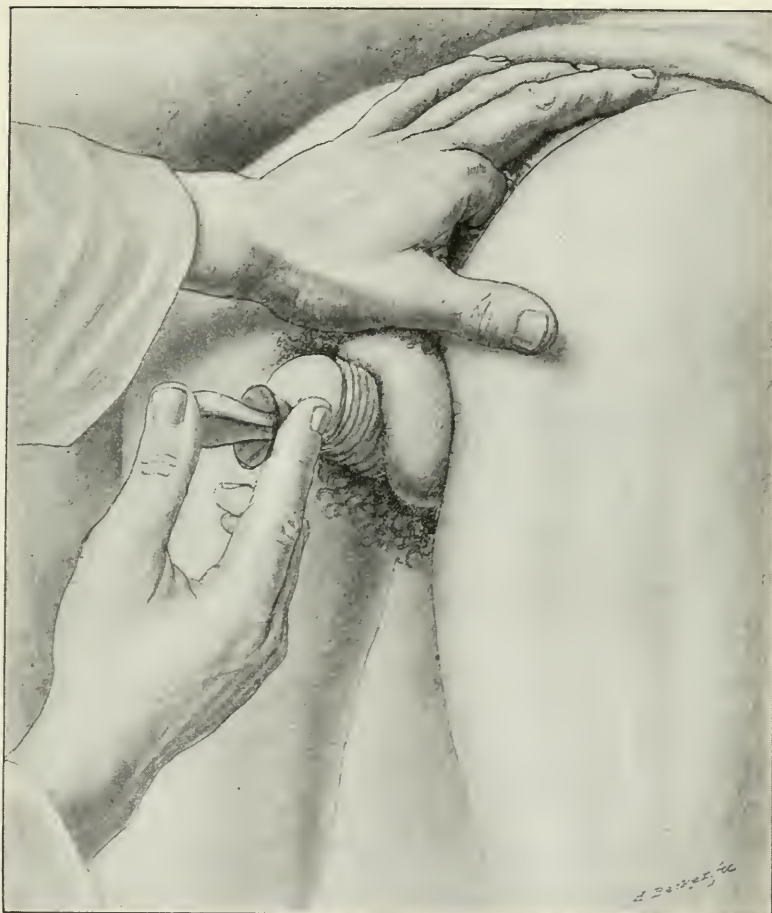


FIG. 3.—When the speculum is inserted with the patient in the knee-chest posture, air is first let into the rectum; then the speculum is introduced as far as the neck of the bladder and guided into the bladder with one finger in the rectum, as shown. The appearance of the penis and scrotum is characteristic.

triangular portion, and still more elevated as it passes through the prostatic portion, and so on into the bladder.

Fig. 3 shows the finger introduced into the rectum with

the patient in the knee-breast position, guiding the end of the speculum into the bladder; Dr. H. H. Young overcomes the resistance at the neck of the bladder by grasping the upper part of the speculum, as shown in Fig. 4, between the thumb and the forefinger, the thumb pressing up in front of the triangular ligament and the forefinger pushing down in the perineum, at the same time the point is pushed onward, the end of the instrument enters the bladder with a little jump, after which its freedom of motion at once tells of the success of the manœuvre.

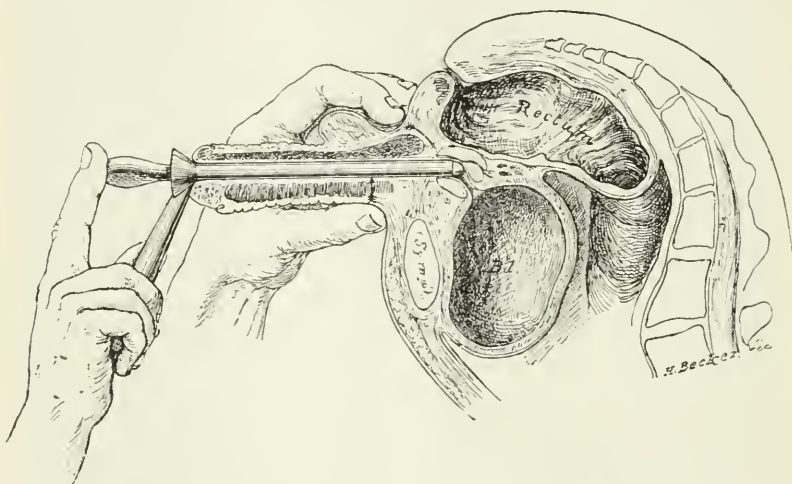


FIG. 4.—Method of conducting the point of the speculum through the prostate and into the bladder suggested by Dr. Young. The rectum is distended with air as it should be, but the bladder is not distended as shown until the speculum is in and the obturator withdrawn.

The obturator is withdrawn as soon as the speculum is in the bladder and the patient in proper position and the rectum inflated; with the withdrawal of the obturator the atmospheric air enters and distends the bladder with an audible suction sound.

The illumination of the interior of the bladder is effected either by direct light, which is the best way, or by a light held close to the sacrum and reflected by a head-mirror of about twenty-five cubic centimetres focal length. If an electric

light, sixteen candle power, it is held close to the sacrum, with a white, enamel-painted, tin reflector back of it, an ordinary head-mirror will direct sufficient light into the interior of the bladder to enable one who is practised in this way of examining patients to see all the details with perfect clearness. One who is not accustomed to this may find it extremely difficult to keep the pencil of the light directed down the tube, as the head-mirror has to be placed at an angle, and the least turning of the head leaves the field in the dark. It is better, therefore, wherever it is available, to use the little mignon electric lamps attached to a steel head-band, with a little bull's-eye in front of the lamp and a ratchet providing for an adjustment of the focus.

The handle of the cystoscope is held either above or below firmly in position, and the light adjusted while the inspection of the bladder is begun. If the bladder has been thoroughly emptied of its urine, the examiner will not be embarrassed by a constant escape of urine out of the speculum with every inspiration.

The position of the examiner is with the head a little below the bladder, looking in a direction slightly upward; if the rectum is not properly distended with air, the bladder will distend so much that he will find it necessary to get his head almost under the patient's pelvis in order to see the base of the bladder.

With satisfactory conditions it will depend upon the amount of elevation of the handle of the cystoscope whether the first part of the bladder, which is brought into view, is the base or the posterior wall. If the posterior wall is seen, it appears as a whitish background, divided up by blood-vessels from a millimetre in diameter down to capillaries spreading out over its surface in the form of a tree, or like rivers dividing up into creeks and rivulets. I have recognized in the male, on the posterior wall, in the right and left hemispheres, two large branching vessels coming from the middle vesical artery, which appear to be quite constant anatomical features in the female. By dropping the handle a

little the base of the bladder comes into view, often considerably foreshortened, so that the area seen at one time is sometimes several centimetres in length, and is never limited to the short area covered by the end of the speculum. By elevating and depressing the handle, and directing it to the right and left in an orderly manner, a continuous impression is made upon the visual sense, so that the examiner is not puzzled by the small area seen at one time, but really sees and retains a comprehensive view of the entire vesical interior.



FIG. 5.—The bladder is now inspected through the long open cystoscope, using for illumination either a reflected electric light (shown in dotted outline), or better, a direct electric light with aignon lamp, a reflector, and a condensing lens.

The trigonum presents a different appearance from the rest of the bladder by its increased injection; it is readily found by withdrawing the speculum until the internal urethral orifice begins to close over the end, and then pushing it in about a half centimetre, and turning the instrument from side to side.

The ureteral orifices will be found at either end of the trigonum by turning the speculum about thirty degrees to the right or left, and looking for the slight eminence on which the orifice is found or for the little slit or mark in the vesical mucosa, surrounded by a little, pale area which signals the location of the opening. By pressing with the upper border of the speculum on the mucosa in front of the orifice the orifice itself is brought into a plane at a slight angle with the plane of vision, and therefore more easily seen. A flexible renal catheter, fifty centimetres long, armed with a stylet, is now carried up the cystoscope, and its point engaged in the ureteral opening, then the end of the stylet is firmly grasped by the assistant and the catheter is stripped off from the stylet up the ureter and so on into the pelvis of the kidney. If the catheter is now left in place after a few minutes the urine will begin to flow.

The following are the important requisites for cystoscopy in the male bladder briefly recapitulated:

If the bladder is free from disease and thoroughly emptied beforehand urine may be collected from the opposite side in the bladder while one side is being drained by the renal catheter.

Some degree of persistence is necessary in order to acquire facility in manipulating the instruments and illuminating the field; the difficulties, however, are not so great as those to be overcome in learning to use the Nitze or Casper cystoscopes.

It will be best while acquiring this familiarity with the method of examination to put the first patients examined under anæsthesia.

The rectum should be thoroughly emptied by an enema, and the expansion will be better if the patient has not taken a full meal recently.

The bladder should be emptied and the glans cleansed and a lubricant injected into the urethra.

The patient is then put in the knee-breast position with vertical or slightly flexed thighs and chest close to table.

A speculum is then introduced into the rectum letting in air.

The vesical speculum is then taken up and introduced into the urethra, into the prostatic portion, and then guided back into the bladder with a finger inserted into the rectum.

The obturator is withdrawn and air enters the bladder audibly, expanding it.

The head-light is adjusted so as to reflect its beams into the interior of the bladder in a line closely coinciding with the plane of vision.

The bladder is then inspected in an orderly manner by turning the speculum from side to side and up and down until every accessible portion has been seen.

The ureteral orifices are found by turning the speculum from twenty-five to thirty degrees to the right or to the left, and recognizing their position either by the slight eminence in the vesical mucosa or by the characteristic appearance of the slit and the immediately adjacent area of the vesical mucosa.

I have devised a little mirror on a long flat handle, accommodating itself to the side of the speculum, for the purpose of bringing into view the vertex of the bladder, as this cannot be seen in the male as it can in a female, by an extreme elevation of the speculum. When the abdominal wall is lax a considerably larger portion of the vertex is brought into view by pushing it up with the hand.

Out of several examinations made at the Johns Hopkins Hospital, in the presence of Drs. J. Bloodgood, O. Ramsay, H. W. Cushing, H. H. Young, G. B. Miller, B. M. Bishop, W. M. Dabney, and others, the first one was in the case of an elderly man with a persistent hæmaturia of undetermined origin. We had examined his bladder first with the Casper cystoscope, and saw a little cloud of blood rising from the base, where there was a red villous mass. The urine clouded up quickly, and the affection appeared to be one of vesical papilloma. Upon introducing my speculum, however, in the manner described, it was at once evident that the base

of the bladder was covered with a layer of blood-clots, and on wiping these off, it was seen to be free from disease. The orifice of the left ureter was seen, and a metal catheter introduced a short distance, and a few drops of bloody urine collected, demonstrating the source of a hæmaturia.

The next patient was a young man, a sexual neurasthenic; the cystoscope was readily introduced, and the healthy bladder inspected by a number of those present. The day following the examination he declared himself entirely cured of his ailment, and left the hospital.

The next patient examined had a small oval ulcer in the trigonal portion of the bladder with a whitish base and sharply defined edges. This was demonstrated as clearly as if it had been on the outside of the body; it was also accessible to touch, to applications, and to the curette.

None of these patients were examined under anæsthesia. I owe the first case I was able to examine under an anæsthesia to the courtesy of Dr. L. Bolton Bangs, consulting surgeon at St. Luke's Hospital, New York City; I am also indebted to Dr. Robert Abbe for the kind interest he showed in giving me his clinic hour at St. Luke's Hospital, February 4, 1898.

The patient was a young man, who had been suitably prepared, and was put under anæsthesia in the presence of Drs. Robert F. Weir, Clement Cleveland, Willy Meyer, F. Tilden Brown, Robert A. Murray, Farquhar B. Curtis, Keyes, and others visiting the clinic, in addition to Drs. Bangs and Abbe.

The patient was put in the knee-breast position, the rectum dilated, and the cystoscope introduced as described into the bladder, and the obturator withdrawn. The source of illumination was an electric mignon lamp supplied by the house current reduced by a Vetter controller.

The light was good and the base of the bladder at once came clearly into view; the posterior wall was seen by elevating the handle a little, then, by turning it to the right and to the left, the left and the right lateral walls were clearly seen. I then withdrew the speculum until the internal urethral

orifice began to close over it, and then pushed it in a little, turned it about thirty degrees to the left and dropped the handle, when the right ureteral orifice came clearly into view, as clearly as I have ever seen it in a woman.

Dr. Willy Meyer looked through the cystoscope and agreed it could not have been seen clearer or more unmistakably if it had been on the surface of the body.

Dr. Ramsay then handed me one of my renal catheters, fifty centimetres long and two millimetres in diameter, armed with a stylet, and this was guided, after two attempts, up into the ureteral orifice, and easily stripped of the stylet, into the ureter, ascending up to the pelvis of the kidney. Dr. Abbe now looked through the cystoscope and saw the catheter entering the bladder wall.

The patient was then put to bed with the catheter in position, and before leaving the hospital I had the satisfaction of knowing that half a test-tube full of slightly cloudy urine had been collected.

The use of straight tubes inspecting a limited portion of bladder, with the patient in the dorsal position, dates as far back, as Dr. Weir has pointed out to me, as the work of Desormeaux, published in 1865; in this respect this method of inspection stands in precisely the same relation to the examination of the male bladder as does Simon's work in the inspection of the female bladder, to my own work in that field. The procedure from being one of a very limited utility has been elevated into an important method by the postural atmospheric distention of the bladder, one which bids fair to largely supplant the electro-cystoscopic methods of Nitze, both in the fields of diagnosis and treatment.

The avenue opened up by the straight free calibre of the speculum affords a facility for treatments of all kinds in the way of applications, electro-cauterization, curettages, the snaring of polyps, and bits of tumors, which is unparalleled.

LARGE MULTIPLE NEUROFIBROMATA OF THE CERVICAL SYMPATHETIC.¹

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THE following unique case of cervical tumor is worthy of record in detail:

The patient, Hilda P., nine years of age, presented herself in September last for removal of a considerable sized tumor of the lower third of the right side of the neck. At first appearance it seemed like a large lymphatic growth. It had been noticed only two months and had given no pain. There was an egg-shaped tumor extending from the right clavicle at its sternal end upward to the level of the hyoid bone. Its unusual relations attracted attention. The sterno-mastoid muscle, the carotid artery, and the jugular vein rested upon it instead of being below it, as in lymphatic growths. It was extremely hard to the touch, and the nearest diagnosis I could arrive at was that it was an unusual tumor of branchial origin.

Operation at Roosevelt Hospital, September 3, 1897.

A long incision was made over the tumor in the line of the muscle, and the jugular and carotid artery were drawn inward, the muscle outward. The tumor was easily isolated, and was embedded in the cellular planes behind the great vessels. It was as hard as cartilage, and on palpation seemed in parts to be almost bony in structure. From its upper end two large and several small branches grew out of it and extended upward far into the neck; others of various sizes extended inward towards the trachea, and still others downward. Their relation to the large mass was not unlike that of the roots of a tree, and the branch-arrangement suggested no growth that I had ever seen before. From the lower end a branch larger than a lead-pencil

¹ Read before the New York Surgical Society, November, 1897.

extended downward behind the sternum and could be followed to a retrosternal bulbous structure of the same type as large as an English walnut. The upper branches were prolonged upward with slightly tortuous and, in parts, straighter courses. One of them terminated in a bulbous expansion of the same density and as large as a walnut, having on its upper end a narrow tail-piece ending at the base of the skull. The other two larger branches, also nearly as large as a pencil, tapered upward in the neck nearly to the same distance. The branches on the median side of the main tumor were numerous and travelled towards the thyroid, being irregular, tortuous, and nodulated. At the lower end of the tumor, on its outer side, a complicated series of branches formed a plexiform net-work, disappearing in the loose structures behind the jugular and subclavian wall, down beyond the reach of dissection. This entire, irregular, dense, white structure was easily separated from its cellular embedding, and, after extending the sternal incision far up in the neck, was entirely isolated, and dissected out *en masse*. The lower plexiform net-work behind the subclavian vein was cut at its lowest available point, leaving only the retrosternal bulbous enlargement. Anatomically it followed the course of no structure excepting the cervical sympathetic nerves.

On section of the main tumor, as well as of the cords, only a dense fibrous structure was seen. No unusual symptoms occurred during the operation. The wound healed by primary union, and the only physical change observed in the child afterwards was suffusion of the ocular conjunctiva of the right eye (which subsided in a week), and an instantaneous and persistent narrowing of the pupil. This contraction of the pupil remains at the end of five months after operation. There was also a narrowing of the palpebral fissure. No other unilateral symptoms were observed, such as flushing of the face or furring of the tongue. The accompanying sketch, made directly after operation, gives the relations and proportions of the tumor with reasonable accuracy.

The pathological report of the tumor, made by Dr. Ewing, of the Department of Pathology, College of Physicians and Surgeons, is as follows:

"Fibrosarcoma of nerve-trunks. On section the tumor proves to be composed almost exclusively of fusiform connective-tissue cells. These cells are much elongated and wavy, recalling



Abbe's case of multiple neuromata and general hypertrophy of the cervical sympathetic system.

the structure of normal connective tissue, while in many loose areas they are larger and multipolar. Their arrangement is characteristic, being massed together in bundles of elongated cells without visible intercellular substance, interlacing with one another in various directions. The amount of intercellular fibrous substance is in many places considerable, and many of the intercellular bands appear to be supported by nearly normal connective tissue; but in the interlacing bands the intercellular substance is usually lacking. The cells are very numerous and the sarcomatous character is well marked. A well-marked connective-tissue capsule surrounds each tumor and its prolongations. No traces of nerve-fibres or ganglion-cells are anywhere found. From the morphology of the cells and their grouping, the tumor may be regarded as originating in the endoneurium of the nerve sheath."

Remarks.—The illustrations in literature of fibroneuromata of the spinal nervous system are very common, but of the sympathetic nervous system there are but few cases recorded, and those are in post-mortem reports.

The nomenclature of nerve tumors has not yet emerged from considerable confusion. Pure neuromata are apparently very rare, and with few exceptions authors, by mutual consent, allow the term neuroma to include the more common forms of fibromata and fibrosarcomata. Many speak of these latter as false neuromata. The older writers, says Virchow, named nearly all multiple tumor occurring in the course of the peripheral nerves ganglions, or ganglionic tumors, but these were probably always of the cerebro-spinal system and contained no ganglionic tissue. Virchow divides pure neuromata into myelenic and amyelenic, or tumors containing medullary nerve fibres and tumors containing only non-medullary fibres.

The more common ones are generally divided into multiple fibromata of the nerve-trunks and plexiform neuromata. It is the third variety or circoid neuroma of the peripheral nerves which is occasionally of great extent, and when associated with hypertrophic changes of the skin and fascia strongly resemble elephantiasis.

Paget describes in his lecture on pathology a disease characterized by painful subcutaneous nodules or tumors, but did not himself demonstrate that they were of nervous origin. They are recognized now as belonging to the neuromata of the cerebro-spinal system. In all the standard works of pathology consulted, as well as a search of the *Index Medicus* of the past ten years, no mention is found of any case of fibroma of the sympathetic system. Yet there are a few cases where these growths are recorded as occurring secondarily to very extensive deposits in the cerebro-spinal system.

Prudden (*American Journal of the Medical Sciences*, Vol. lxxx, p. 134) collected records of forty cases of multiple neuromata, some of which at autopsy showed involvement of the various portions of the sympathetic.

Virchow cites a case of Schonlein, near Würzburg, of multiple neuromata, in a twenty-year old girl, where there were neuromata in the spinal nerve-roots, and also the upper sympathetic ganglion was enlarged into a tumor two by three inches in size, in connection with thickened and knotty nerves. This person had been healthy up to within a few weeks of her admission to the hospital, when after catching cold she had pain in the arm, formication, numbness of the limbs, paralysis and contraction of the fingers, rapid emaciation, palpitation, and finally died from exhaustion.

A case was presented by Dr. Satterthwaite before the New York Pathological Society, in June, 1880 (*New York Medical Record*, 1880, Vol. xvii, p. 239), of multiple neuromata involving cortical, spinal, and sympathetic systems. Here there were very extensive tumors of the sacral, lumbar, cardiac, and œsophageal plexuses, and the cervical sympathetic. This is about the only case in literature of a true neuroma of the sympathetic.

A case was recorded by Reynold (*Manchester Chronicle*, 1896-97, p. 185) of multiple neuromata of very wide extent, and on autopsy found to involve the sympathetic trunks and branches.

A STUDY OF THE CASES OF DISEASE OF THE
FEMALE GENERATIVE ORGANS PERSON-
ALLY TREATED DURING TEN YEARS' WORK
IN THE METHODIST EPISCOPAL HOSPITAL
IN BROOKLYN.

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(Concluded from page 362.)

Carcinoma of the uterus was met with in twenty-five patients, only four of whom were under forty years of age. There were also four cases in patients between sixty and seventy years of age. The period between forty and sixty years presented the remaining seventeen. All but two had borne children. In twenty instances the disease had developed originally in the cervix, in five the body of the uterus was the primary seat. Of the cases of cervical carcinoma, in eight—40 per cent.—the disease had already extended into the adjacent tissues of the broad ligament, vagina, or bladder to a degree that made any effort at radical removal manifestly useless, and the treatment was limited to curetting and the application of chloride of zinc tampons. Of the remaining twelve patients, five were subjected to vaginal hysterectomy, and seven to abdominal hysterectomy. All the cases of vaginal hysterectomy recovered from the operation; one death occurred among those in which the abdominal route was used.

In this fatal case the patient developed on the third day the symptoms of obstruction of the bowels, and rapidly went into

collapse; the lower part of the abdominal wound was promptly reopened and the first knuckle of distended gut that presented was drawn out and opened, which, though followed by the copious escape of fluid faecal matter and gas, did not effect any improvement in the general condition of the patient, who died within a few hours thereafter. Autopsy revealed no satisfactory explanation of the obstruction; the conditions in the operative field were perfect; firm adhesions between the apposed pelvic peritoneal surfaces had already closed off the vaginal stump; there was no peritonitis nor accumulation of fluid in the peritoneal cavity; there was no adhesion nor angulation of the intestine; the upper half of the small intestine was in a condition of parietic distention; the lower half was empty and collapsed but without any obstructive body, thickening, or adhesion at the point where the alteration in the intestinal condition began. The woman had been a free consumer of morphine previous to entering the hospital, and the possible influence of this drug to favor the post-operative absolute paralysis of the muscular coat of the jejunum is the only suggestion as to its cause that her history presents.

Naturally the cases of vaginal hysterectomy include those in which the disease was the most limited, and the probabilities of extension of the disease into the adjacent tissues were the least.

The after-course of the majority of these cases demonstrates the frequent inadequacy of simple removal of the uterus, even in cases where the carcinomatous degeneration is apparently restricted to it, for in three of them speedy recurrence in the broad ligament stump or in the vaginal cicatrix took place, with death five months, twelve months, and eighteen months respectively thereafter. In the remaining two cases, however, the women are known to have been well after periods of two and a half and four and a half years respectively. The thought is natural that had all these women been subjected to the wider removal of circumuterine tissue, that could have been safely effected through an abdominal incision, a larger proportion of permanent recoveries

would have been secured. The present tendency of my judgment is that in all cases of carcinoma of the uterus the combined vaginal and abdominal methods of attack should be employed, and that with the uterus should be removed a liberal zone of the attached vagina, and that the incisions from below should go as far away from the uterus as is compatible with the integrity of the bladder, ureters, and rectum, while from above the removal should include the entire broad ligament, the round ligament, and especially the lymphatic nodes at the brim of the pelvis, and the chain of lymphatics extending from them to the cervix. In order to accomplish readily this extensive intrapelvic removal of tissue, it is essential that, immediately after the ligation of the round ligaments and of the ovarian artery in the upper margin of each broad ligament, the internal iliac arteries should be exposed and, after double ligation, be cut across. The further deep dissection is thereby rendered comparatively bloodless. On the inner side of the wound made for exposing the internal iliac artery the ureter is readily identified, and with care may be avoided as the dissection deepens towards the bladder. That even in cases in which in the course of the operation it becomes evident that it will be impossible to eradicate the disease, the ligation of the internal iliac artery may serve to retard a further advance of it, there seems to be some clinical proof which, however, needs further corroboration. The following case is one in point in this respect:

A woman, forty-seven years of age, was admitted in a state of marked anæmia and cachexia, with the vagina distended by a bleeding cauliflower-like mass springing from the cervix uteri, and extending to the adjacent vaginal mucosa. The lower segment of the uterus was removed *per vaginam* by cutting and by the cautery, the vaginal fornices were incised, after which the operation was pursued from above through a median suprapubic incision; the broad ligaments were widely laid open and the connective tissue and lymphatic contents removed. The internal iliac arteries were ligated, and all the grossly diseased tissue was

removed, but the operator felt morally certain that points of disease must have escaped detection and have been left behind. The patient made a satisfactory recovery from the operation, and returned to her home in a distant part of the State. A prompt recurrence with rapid decline was expected by me, but, on the contrary, ten months later her local physician, Dr. E. S. Persons,



FIG. 7.—Carcinoma of the body of the uterus, showing condition of the uterus at time of extirpation.

of Gilboa, N. Y., writes me as follows: "She looks much better than she has at any time within the past four years, weighs 140 pounds, and does the housework for herself and husband. I made a careful examination a few days ago; found no vaginal discharge of any nature; on the posterior surface of the vagina, about one and one-half inches from the orifice, I found a small

elevation of the membrane, which was tender to the touch; a little farther up progress was arrested by cicatricial bands, which were also somewhat tender. She has a good appetite, no difficulty in emptying the bowels or bladder, and seems to be in good health."

What course to pursue when, as is frequently the case, the disease is found to involve the ureters and the base of the bladder has been a subject of much thought with me.



FIG. 8.—Carcinoma of the body of the uterus, showing condition present at time of operation.

Up to the present time I have forced myself to leave such cases incomplete on account of the special dangers incident to removal of segments of the bladder and ureters. I have not been satisfied, however, with this course, and am inclined to the opinion that it would be justifiable to freely excise all the tissues involved in the disease, and then proceed to make such plastic repair as the conditions called for. The ureters

may be implanted into the upper part of the bladder, or possibly into some part of the bowel, and the bladder defect may be sutured. The length of time required for carrying out such procedures would undoubtedly be such as to materially increase the primary mortality of operations for uterine carcinoma, but there are no insuperable technical difficulties attaching to them, and the otherwise certain fatal progress of the disease, and the frequent prolonged physical and mental agonies attending the later progress of the disease are such as to warrant the incurring of any risk to avoid them.

All of the five cases of carcinoma of the body of the uterus were submitted to the combined vaginal and abdominal method of extirpation. All made uninterrupted recoveries from the operation, with one exception, in which case carcinomatous degeneration had supervened in a uterus which was the seat of a pre-existing myoma, whose existence had been known for six years. Close and extensive adhesions of the omentum had formed with the enlarged uterus, and multiple carcinomatous nodules studded the omentum. The whole omentum was cut away close to its attachment to the colon, and with the uterus removed *en masse*. The operation, though a prolonged and severe one, was well borne at the time, but on the following day pulmonary oedema and uræmia developed, quickly resulting in death. Of the four cases that recovered from the operation, two are known to still remain free from disease, at periods of two years and three and a half years respectively; the condition of the third has not been ascertained; in the fourth case, three years later, the patient was still in good general health, but on examination there was an evident growth developing in the stump of one broad ligament, and an enlargement of the inguinal glands, indicating recurring malignant disease. Fig. 7 shows the condition of the uterus in this case at the time of its extirpation. Fig. 8 shows the condition present in another case operated upon a few weeks earlier, who still remains well.

THE FALLOPIAN TUBES.

The affections of the Fallopian tubes that have presented themselves I have classified as (a) *acute salpingitis*; (b) *chronic adhesive salpingitis* (pachysalpingitis); (c) *chronic suppurative salpingitis* (pus-tubes); (d) *chronic suppurative salpingo-ovaritis* (pelvic abscess); (e) *tubal pregnancy*,—in all thirty-eight cases.

Acute salpingitis was present in only seven cases; all young women from seventeen to thirty years of age. In two cases the tubal inflammation was due to the extension of a puerperal infection; in three to the advance of a gonorrhœal endometritis; in the remaining two cases the cause was not clear. The symptoms presented were acute pelvic pain and tenderness, elevation of temperature, and quickening of pulse, great sensitiveness of the genital tract, and appreciable distention of one or both tubes, together with a variable amount of broad ligament infiltration. Two of the cases were sent into the hospital under the supposition that they were suffering from appendicitis, but no uncertainty as to the diagnosis remained upon examination after their entrance. All rapidly improved under non-operative treatment, which included rest in bed, saline laxatives, copious, hot vaginal douches, and cold by means of an ice-bag or iced-water coil to the hypogastrium.

Chronic adhesive salpingitis, as indicated by thickening and tenderness of the tubes, discoverable by conjoined vaginal and abdominal palpation, has existed to some degree in many of the cases of metritis and endometritis, and in all the cases of infective ovaritis, and has found its treatment in connection with that called for by those conditions. But a small group of cases exists in which the tubal affection has been the predominant condition. Nine such cases have been noted. This small number is by no means any indication of the comparative frequency of such conditions; its explanation is rather that the condition is generally quite amenable to treatment in the homes of patients, and that therefore comparatively few of them find their way to the beds of a

hospital. No operative treatment was resorted to in these few cases, except a curettage of the endometrium in two of them; they were subjected to rest in bed, saline aperients, hot vaginal douching alternating with tampons of ichthyol and boroglyceride. The average length of time of hospital treatment for them was seven weeks. All were discharged much improved. One case returned to the hospital one year later with symptoms much aggravated, the ovaries and pelvic peritoneum having become involved in the infective process. She was relieved by removal of the affected appendages.

Chronic suppurative salpingitis, with free discharge of pus into the uterine cavity, was noted in one case.

This woman, for the relief of chronic endometritis, with lacerations of cervix and perineum, had been subjected to curettage and plastic repair of the lacerations. Four months later she returned to the hospital, with the history that for two months, following an attack of acute pelvic pain, which had confined her to bed for a week, she had suffered from constant pelvic distress, with free purulent vaginal discharge. Upon examination the right tube could be felt as an egg-sized swelling, pressure upon which would cause a free flow of pus to escape from the uterine canal. For ten weeks she was retained in bed, and subjected to uterine and vaginal irrigations, without much apparent benefit, except a diminution in the size of the tubal dilatation. The abdomen was then opened, and the affected tube with its ovary was excised. The tube walls were thickened and congested, its lumen dilated, and its mucosa in a condition of chronic purulent inflammation, the products of which flowed into the uterine cavity. The ovarian end of the tube was sealed, and no pelvic adhesions were present. A smooth convalescence from this operation followed; the purulent uterine discharge and the irritative temperatures ceased, and the patient was improving in flesh and strength when she left the hospital; but a letter from her physician, six months later, stated that after her return home, she had been having such pain in the iliac region, without any alteration from the normal of pulse or temperature, that she was forced to remain recumbent most of the time.

Pelvic Abscess.—Under this head are included a group of seventeen cases, in all of which there was localized abscess-formation within the pelvic cavity; of these one was a suppurating phlegmon of the left broad ligament, one was due to tuberculosis of the appendages and the pelvic peritoneum, with formation of multiple small abscesses, and the remaining fifteen were due to pyogenic infection transmitted from the uterus through the tubes, being examples of chronic suppurative salpingo-ovaritis. In the case of the broad ligament phlegmon it was possible to evacuate it through a free incision in the left inguinal region, after which a rapid convalescence followed. A median abdominal section with removal of pus, excision of necrotic tissue, and temporary iodoform gauze drainage was resorted to in the tuberculosis case, which was followed by a rapidity and soundness of healing that were unlooked for, and by the disappearance of all local symptoms, an improvement which has persisted to date, one year later. Partial excision only of the ovaries was done, and the menstrual functions have continued normally.

Chronic suppurative salpingo-ovaritis, due to infection transmitted from the endometrium, constituted the great mass of the cases of intrapelvic abscess. In five of these there was a clear history of infection after miscarriage, and two after childbirth at term. Two cases were apparently of gonorrhoeal origin; two were consecutive to curettage done at their homes without sufficient antiseptic precautions; in one the acute suppurative process followed exposure to cold while menstruating; in the remaining three no reliable suggestion as to cause was elicited.

Of these fifteen cases, one, profoundly septic when admitted, developed steadily thereafter such evidences of generalized pyæmia that no operative interference was instituted, and death followed at the end of five weeks.

In a second case the patient, a woman, thirty-six years of age, in fair general condition, but invalidated by the presence in the pelvis of a moderate-sized salpingo-ovarian abscess of a year's duration, after having undergone the preparatory

treatment of rest in bed, vaginal douches, and glycerine tampons, with aperients, upon the third day of a menstrual flow, no instrumentation nor local interference of any kind having been attempted, developed severe abdominal pain with high temperature; progressive general peritonitis followed, terminating in death. No autopsy was allowed by her friends, but through the canula of the embalmer, when thrust into the peritoneal cavity, pus flowed. This woman had apparently borne quite well the fatigues of a long journey from a distant State to reach the hospital, but the traction upon the limiting adhesions of the abscess had evidently so weakened them that they gave way under the added tension of the menstrual congestion and flooded the peritoneal cavity with pus. Resort to immediate incision and drainage of the abdomen was prevented by the necessity of first communicating with and obtaining the consent of distant friends.

In a third case, the abscess had already spontaneously opened into the rectum. By the use of aperients, hot vaginal douching, rest in bed, and a general tonic regimen, her condition steadily improved, until her discharge, greatly relieved, without resort to any operative procedure.

Of the twelve remaining cases, in one the abscess had already been opened by an incision through the posterior vaginal fornix. It was conducted to a cure by enlarging the original incision, and through it enucleating the suppurating tube and ovary, which still remained. In a second case, with double abscess, one was successfully dealt with by vaginal approach, but the other was located so high up in the pelvis that it was deemed best to attack it from above through an abdominal incision, which was done at another sitting two weeks later, and with the happiest result. In ten cases abdominal incision was resorted to at the beginning; all recovered from the operation, and in all but one full and rapid restoration of health followed.

In this one case the woman was brought from the State of Florida, in a state of great emaciation and marked prostration

from prolonged septic absorption, and from a chronic diarrhœa. A large, thick-walled abscess cavity behind the uterus was opened into and evacuated; the degenerated appendages were removed, the posterior cul-de-sac was pierced through into the vagina, and through and through drainage with rubber tubing instituted. On the twelfth day thereafter fæces began to escape through the drainage openings, and continued to appear in varying quantity throughout her stay in the hospital. Only a temporary improvement in her general condition followed the evacuation of the abscess; the diarrhœa persisted despite every care by diet and internal medication to check it. An intense longing to see her home again occupied her mind, which was finally gratified by her husband, who removed her from the hospital despite her hopeless condition, and undertook with her the long journey to Florida. She reached her home alive, but died within a few hours thereafter.

Through and through tube-drainage, the tube passing from a suprapubic opening into the pelvis behind the uterus and through an opening at the bottom of the cul-de-sac into the vagina, was resorted to in two other cases, with most satisfactory results. Removal of the uterus, with consequent vaginal drainage, was resorted to in yet another case, on account of the extensive denudation to which the uterus had been subjected in the enucleation of the diseased appendages. An uninterrupted recovery followed. In the remaining cases, six in number, iodoform gauze drainage was used for a period varying from four to ten days after operation.

Use of Drainage.—It will be observed that a free resort to drainage has characterized the treatment of all these cases of intrapelvic suppuration; in certain cases the pyogenic walls of the abscess cavities have been thick enough and limited enough to make it practicable to enucleate them sac-like; sometimes it has been possible to do this without rupture of the sac, but more frequently the sac has been ruptured and some soiling of the region of operation with pus has occurred. In all cases of enucleation extensive denuded surfaces have remained, presenting much shreddy material ready

to fall into necrosis, and sure to be the source of an abundant exudation. As far as possible over all such raw surfaces the adjacent peritoneum has been drawn so as to cover them in; notwithstanding the possibility that in many instances the pus collection had become sterile, and the ability of the peritoneum to dispose of a limited amount of infective material, especially in patients who have already been immunized by absorption of toxins from a long-standing pus cavity, has been appreciated, yet it has been deemed wiser in all these cases, as a rule, to take advantage of the local inhibition exerted by the iodoform contained in an iodoform gauze tampon, while at the same time the primary abundant exudation of blood and serum should be led to the surface along its meshes as a drain. The favorable progress of the cases so treated has been so uniform that no disposition has been felt to experiment with other methods. Upon the third or fourth day the primary tampon drain is usually removed, and replaced by a much smaller one, usually a single strand of folded gauze carried to the bottom of the cavity. At the end of another forty-eight hours, if but a scanty serous secretion appears, the drain is removed altogether, and the parietal wound either closed by suture or left to granulate. If a purulent secretion from the drain-track appears, a moderate-sized, soft-rubber tube is inserted, and the further care of the sinus has been conducted on the same lines as are adopted for similar conditions in other parts of the body. The use of such a tube has been required very rarely.

In the abscess cavities not possessing any distinct enucleable wall, a large-sized rubber tube has been inserted at once as a drain in addition to the iodoform gauze, the latter not being omitted; in cases in which a pocket of the abscess extended deeply into the cul-de-sac behind the uterus, the vagina has been opened into at the bottom of the cul-de-sac, and one end of the tube carried through into the vagina, while the other was secured in the suprapubic wound. Many of these cases of large pelvic abscess are susceptible of ready evacuation and cure by approach from the vagina alone, re-

quiring, however, in many cases total removal of the uterus for satisfactory treatment of them.

Tubal pregnancy with rupture of the sac and hæmorrhage into the pelvis, was met with in four cases; in women aged, respectively, twenty-five, twenty-eight, thirty-one, and thirty-six years. Two had never been pregnant before, although they had been married eight years in both instances. The third patient had borne three children, the youngest being two years old, and the fourth one child fourteen months previously. In one case the rupture and hæmorrhage were between the folds of the broad ligament; in the remaining three the rupture was into the general peritoneal cavity; in two of the latter limiting adhesions had formed, matting together intestines and pelvic viscera so as to confine the effused blood; in the remaining case no adhesions had formed, and the abdominal cavity was filled with blood. All recovered after abdominal section and removal of the effused blood and ligation of the bleeding vessels, except one case, in which intense sepsis had been introduced previous to her admission by her medical attendant, who had introduced an unclean catheter into her uterus, and left it there for the purpose of inducing the uterus to empty itself, having been under the impression that the case was one of abortion.

CASE I.—This woman, when admitted to hospital, was in a state of profound septic depression, delirious, and with a temperature of 104.2° F. The abdomen was swollen, with hypogastric dulness and tenderness. Vaginal examination revealed the uterus crowded upward and forward by a fluctuating mass which filled the pelvis. She had been married eight years, had never before been pregnant, had menstruated last fourteen weeks previously, soon after which she had manifested the usual signs of pregnancy. At the end of ten weeks she was suddenly seized with agonizing pain in the pelvis. After remaining for several days in an apparently critical state she gradually rallied, and after two weeks was able to be transferred from the country where she was to her home in Brooklyn. After another week she began to have slight uterine hæmorrhage with renewed pelvic pain.

The pain and constitutional disturbance increasing, and no ovum having been expelled, her physician thought to expedite the completion of the abortion by introducing a catheter into the uterus and leaving it there for forty-eight hours. This was followed by the expulsion of a membranous mass, with slight hæmorrhage, and great aggravation of her previous symptoms, with the addition of rigors. She was then brought to the hospital in the condition noted above. Immediate abdominal section was done, and the pelvis found filled by a fluctuating tumor walled in by thick adhesions between intestines and pelvic walls. These having been broken away, a large quantity of broken-down blood-clots, pultaceous material, and shreddy fibrinous *débris* was scooped out, among which was found a fœtus of ten weeks' development. The pseudo-sac was thoroughly cleaned out, irrigated, and drainage provided for by combined gauze and tube-drains. The immediate effect upon the patient was excellent; the temperature from 105.2°, which it was immediately before the operation, fell to 101°, and the pulse from 110 to 90. The delirium, however, continued. The symptoms of overwhelming septic infection gradually reappeared and terminated in death during the third day.

Subsequent reflection upon this case has suggested to me the thought that a more favorable course might possibly have followed the removal of the uterus, either as the first step in dealing with the pelvic condition, removing it through the vagina, and opening up thus freely the infected hæmatoma from below, or completing the work by its removal as the last step of the operation which was done. The organ was undoubtedly in a condition of acute septic inflammation, and its removal would have been justifiable. Such a course was pursued in the following case with the happiest result.

CASE II.—A woman, thirty-six years of age, after the birth of her third child was invalided by endometritis, for which, ten months later, she was treated at this hospital with entire relief. For one year after her return home she remained well. Then a bloody vaginal discharge, accompanied with occasional paroxysms of sharp pain in the hypogastric region, appeared and per-

sisted for five weeks, when it culminated in a very profuse hæmorrhage, which lasted for two days. After this the discharge was irregular, but to some extent was present most of the time, and was attended with pelvic pain, vesical irritability, loss of flesh and strength, and entailed confinement to bed. Eight weeks after the beginning of these symptoms she entered the hospital, when examination showed the uterus enlarged, reaching above the pubes, a cyst of the left ovary, the size of an orange, was appreciable, and to the right of the uterus, continuous with it, was an indurated mass which extended up to within six centimetres of the umbilicus. After abdominal section the cyst of the ovary was removed; the right broad ligament contained a cyst the size of a cocoanut, which was filled with clotted blood. The contents of this cyst were removed, and the cyst wall dissected out. The uterus was then removed, and drainage of the broad ligament spaces accomplished by a mesh of iodoform gauze through the vagina. Abdominal wound closed throughout. Uncomplicated recovery followed. The pathologist reported the cyst wall to be the wall of an ectopic gestation sac. No ovum was recognized.

The history of the remaining two cases is, in brief, as follows:

CASE III.—The woman, twenty-eight years of age, had been married eight years. She was supposed to have had a miscarriage early in the second month about one year after marriage. She had recently missed two menstrual periods, and supposed herself to be pregnant. Three weeks before admission she had been suddenly seized with severe pain in the hypogastrium, which lasted half an hour, and was followed by the appearance of a bloody vaginal discharge. On the following day she suffered a much more severe attack, lasting an hour, and then a shreddy mass escaped *per vaginam*. She was able to be about for the following week, when increased pain and tenderness in the pelvis caused her to go to bed. At the time of admission she had been reclining for about two weeks. The bloody flow had persisted, but was less in quantity. Vaginal examination showed the uterus crowded over to the right, and a soft tumor occupying the left broad ligament about the size of two fists.

Operation.—Median abdominal incision extending from the

symphysis to the umbilicus. There was considerable bloody serum in the peritoneal cavity. The pelvis was filled by a bloody tumor, confined by adhesions between the uterus and intestines. The tumor, on being broken into, was found to be filled with fluid and clotted blood. This was emptied by scooping out with the hand about a quart of material. Upon the posterior wall of the cavity a cylindrical mass the size of a hen's egg was found attached. This was enucleated and proved to be an amniotic sac. A bleeding point in the pelvic wall was discovered and ligated. The cavity was found to be situated in the post-uterine sac. The remains of a greatly distended tube were found embedded in plastic exudate. The ragged margins of the hole were sutured to the abdominal wound, and the upper two-thirds of the wound closed. The hæmorrhagic cavity was drained with iodoform gauze.

The patient made a good recovery. The packing was changed on the fourth day. The cavity granulated, and the superficial wound was finally closed with secondary sutures. Patient discharged well at end of five weeks, and has since remained in good health, four years now having elapsed since this experience.

CASE IV.—Julia K., twenty-five years of age, married, had been delivered eleven months before after a normal gestation, and had menstruated regularly thereafter until within eight weeks, when she skipped a period, and supposed herself pregnant again. At about the time of her next period she began to experience transient attacks of pain referred to the right iliac fossa, with occasional discharge of blood from the vagina, the pain being relieved whenever the flow appeared. Ten days before admission to hospital she had an attack, suddenly coming on, of very severe pain, which shortly subsided after the appearance of a more profuse vaginal hæmorrhage. On the day of admission, at noon, she experienced a sudden agonizing pain in the same region, and went into syncope, with skin bedewed with cold sweat and a fluttering pulse of 136. The physician who saw her at this time, Dr. J. L. Kortright, finding the entire pelvic vault depressed by a soft, fluctuating swelling which filled the cul-de-sac, accompanied by the general signs of internal hæmorrhage, made a diagnosis of ruptured tubal pregnancy, and sent her at once by ambulance to the hospital. When she reached

the hospital, at about nine o'clock, P.M., she presented a pulse of 100, weak, and a temperature of 100.6° F. She was pallid and restless; there was great tenderness on pressure in the right iliac fossa; the abdomen was somewhat distended, with flatness on percussion and distinct percussion-wave across its lower half. At midnight, twelve hours after the inception of the acute symptoms, the abdomen was opened. A large quantity of fluid and clotted blood was found free in the general peritoneal cavity; the pelvis was filled with a dense clot, by the removal of which a bleeding cavity, with irregular walls, in the site of the right Fallopian tube was exposed. Nothing that could be distinguished with positiveness as an ovum was found. After toilet of the peritoneal cavity, and free flushing with hot saline solution, the abdomen was closed, except at the lower angle of the wound, where a gauze drain was placed. The patient reacted well from this operation, and made an uneventful recovery.

THE OVARIES.

Chronic Infective Ovaritis.—In considering the affections of the tubes, the fact of the involvement of the ovary in many of them has been stated. All the cases of abscess of the ovary have been included in those classed as tubo-ovarian, or pelvic abscess. In many instances of metro-salpingitis, the infection, while not virulent enough to induce suppuration, is sufficient to excite a more or less extensive adhesive inflammation in the peritoneal surfaces adjacent to the pavilion of the tube; the fimbriæ become agglutinated, sealing up the end of the tube, and often causing its adhesion to the surface of the ovary; the inflammation extends more or less deeply into the substance of the ovary, producing the ordinary changes which follow inflammation of a glandular organ; but of more immediate importance is the inflammatory exudate by which the surface of the ovary becomes covered, and which tends to induce extensive adhesions with the peritoneal surfaces of broad ligament, uterus, cul-de-sac or bowel with which it may chance to come in contact. Not infrequently the uterus, swollen and retroflexed, is firmly bound down in its malposition by these adhesions, and its condition of

chronic inflammation perpetuated. The ovaries remain persistently hyperæmic and pass through the various stages of hyperplasia and cirrhosis with formation of many small cysts out of degenerated and dilated ovarian follicles. The predominating symptom in these cases is pain, never absent but most aggravated at the menstrual crises, and the result is chronic invalidism. Etiologically the condition is one of *chronic infective ovariitis*; viewed from the point of the ultimate pathological changes, the condition is one of *microcystic ovarian cirrhosis*, of infective origin. In thirty-one instances this condition of the ovary was demonstrated to exist by abdominal section. The patients were, as a class, young married women, thirteen being between twenty and thirty years of age, fifteen between thirty and forty, and but three over forty. In all the symptoms developed from infections received after marriage, and in the great majority of cases were consecutive to childbirth or abortions. In eleven of the cases the pelvic trouble followed the birth of the first child. In six cases only is it stated that the woman had never been pregnant. In a small proportion of the cases was a gonorrhoeal history elicited. Endometritis was present in all, and in seventeen, or more than half of the whole number, the uterus was in a state of retroflexion and adherent in its malposition. The duration of the disease, previous to admission to hospital, varied from one to twenty-three years, the latter history having been presented by a woman of forty, who had never been well since the birth of her first and only child, when she was seventeen years of age.

Without exception these women had already been subjected to prolonged treatment by many methods, and usually by many physicians, before resorting to the hospital, and by reason of failure to obtain permanent relief from non-operative measures came finally as supplicants for surgical relief.

The *treatment* adopted for these cases has been as follows: After a preliminary preparation, involving from three to seven days' rest in bed, with aperients and antiseptic vaginal douches, curettage of the endometrium has first been done, after which

a suprapubic abdominal opening has been made sufficiently free to expose fully the pelvic contents while the patient was in the Trendelenburg position; then enucleation of the uterus, tubes, and ovaries from their adhesions has been effected. Careful examination of the enucleated organs has then been made for the purpose of deciding as to the necessity of their total or partial removal. During the earlier years of this work total ablation of both appendages was more frequently resorted to, but of late a growing conviction of the importance to the economy of woman of the presence of ovarian activity has prompted me to resort rather to the resection of the more grossly altered portions of the ovaries and to retain sufficient of their substance to insure continuance of an ovarian influence in the individual. I have been the more ready to do this on account of a conclusion that the pain in these cases was chiefly due to intraovarian tension, the thickened capsule yielding to the swelling of its parenchyma from either inflammatory or functional engorgement less readily than the normal capsule, while the spontaneous emptying of the contents of the ripe follicles in ovulation is prevented by this unyielding tunic, and their degeneration into intraovarian cysts is occasioned. If, with the breaking up of the adhesions which bound the ovaries down in abnormal positions, and impeded the normal freedom of the flow of blood through their vessels, and with their restoration to their normal position in the pelvis, all of the more grossly altered portion of the ovaries themselves should be cut out, including a liberal portion of the thickened tunic, and apposition of the cut surfaces should be secured by proper suturing, there would be yet left in many cases sufficient of the glandular structure to maintain the ovarian influence in the economy, while the organ would be bisected by a thin layer of scar tissue more pliant and distensible than the sclerosed tissue removed. The patency of the Fallopian tubes, or indeed their preservation, or that of the uterus itself, is a matter of unimportance as far as this particular function of the ovary is concerned. It remains for future experience to show whether decided advan-

tage may not also often attach to the preservation of the ovaries in many cases in which the uterus and tubes have to be removed.

The technique of ovarian resection is very simple; the ovary, having been enucleated from its adhesions, is brought up into the abdominal wound and secured by a hæmostat applied to either end of its meso-ovarium; gauze compresses are packed about it so as to shut off the general cavity of the peritoneum; then with a scalpel a longitudinal wedge-shaped section is cut out of the ovary, involving as much of its substance as the particular condition of the organ may call for, the effort being to remove most of the cysts and the evidently cirrhotic tissue. The rather free hæmorrhage from the deeper part of the cut is checked by the proper placing of the sutures. These are of fine catgut, applied with a well-curved needle; usually two rows have been employed, one for the deeper portion of the cut, and one for the capsule, as the needs of even and complete apposition of the ovarian flaps in the particular case may suggest. The suturing having been done, and perfect hæmostasis having been assured, the ovary is replaced in the pelvis, and receives no further attention.

Of the thirty-one cases under consideration, in seventeen a clean removal of both ovaries and tubes was done; in three cases removal of one ovary and tube only was done; in four cases ablation on one side and resection on the other were done; in two cases resection of one ovary only was done, and in five cases resection of both ovaries was done. In one case it was thought best to remove the uterus on account of the extent of the denudation of peritoneum to which it had been subjected; in another case the uterus was removed, more than a year afterwards, on account of the persistence of an intractable metritis. In two instances in which ovarian resection was employed the patency of the closed tubes was restored by a plastic operation, as follows: The closed ends were cut away obliquely, and the canal was split up for half an inch; and then along the cut thus made the

mucosa was sutured to the serosa of the tube by fine catgut. The whole proceeding was quite analogous in its technique to a circumcision in the male.

In the great majority of these cases the abdominal wound was closed without any provision for intraperitoneal drainage, twenty-three out of the thirty-one having been thus treated. In eight cases drains were employed, glass tube in one case, gauze folds in seven. The drained cases were chiefly ones in which the oozing from the abraded pelvic surfaces was considerable, and it seemed best to the operator to keep it in check by the pressure of a gauze tampon for a period. No disadvantage is known to have arisen from this precaution in these cases; they all made smooth recoveries after the removal of the tampon-drain on the third or fourth day. There were two deaths among the undrained cases; one death was due to the retraction of the ovarian artery from the grasp of the ligature, causing a fatal intraperitoneal hæmorrhage; the other death was due to intestinal obstruction, caused by angulation of a knuckle of small intestine produced by adhesion to the abraded retro-uterine surface.

Ultimate Results.—The later history of some of these patients has not been ascertained, but at the time of leaving hospital, usually at the end of four weeks after operation, the relief from their previous pain and disability was marked; in no case has it been necessary for any one of them to return to the hospital for further treatment, except in the one case of intractable metritis, already mentioned. Many have been heard from, either in person, or by letter, or by communications from their physicians. In most instances there has been reported complete disappearance of pelvic pain, and re-establishment of general vigor; in some instances, while great improvement has been reported, some pain is still complained of. In the cases from whom both ovaries had been removed the nervous disturbances incident to the menopause have been complained of but little, being lost sight of in the presence of the great relief to the pre-existing suffering. The question as to whether as absolute and definite relief to the

ovarian symptoms will be secured by partial resection as by total ablation remains still to be settled by longer and larger experience.

In one instance, that of a young married woman, twenty-five years of age, who had always suffered from dysmenorrhœa, but who had borne two children, and, after a miscarriage with a third, had developed a salpingo-ovaritis with retroflexion of the uterus and extensive intrapelvic adhesions, the entire operative treatment included curettage and trachelorrhaphy of the uterus, abdominal section, systematic separation of adhesions, total ablation of the right ovary and tube, partial resection of the left ovary, and suture of the fundus to anterior wall of the abdomen. Six months after her return home she wrote that she was menstruating regularly without much pain, and that she was able to go about with freedom. Two years later, in January, 1898, she reported that she was six months advanced in pregnancy.

In another instance a young married woman, twenty-eight years of age, never pregnant, was admitted with uterus in retroversion, the fundus, tubes, and ovaries bound together by the adhesions resulting from a salpingo-ovaritis. In this case partial resection of both ovaries was done, with ventrosuspension of the uterus. Free oozing from extensive abraded surfaces was treated by a gauze-drain tampon. Uncomplicated recovery followed. Six months later her physician reported that she was in perfect health.

Chronic Idiopathic Ovaritis.—Quite distinct in the matters of age, previous history, general symptoms, and local complications has been a group of cases, numbering twenty-seven in all, in whom ovarian pain and tenderness have been the dominating symptoms, but in whom there has been no history of pre-existing infective metro-salpingitis. In thirteen of these cases the abdomen was opened and the nature of the ovarian condition demonstrated by inspection and incision. The gross appearances of the ovaries themselves were similar to those described in the preceding section as attending inflammation of the ovary caused by infection from the tubes, presenting every stage of chronic hyperplasia, fol-



PLATE IV.—OVARY AND TUBE PRESENTING CHANGES INDUCED BY CHRONIC
IDIOPATHIC OVARITIS.

Hyperplastic organ distended by multiple microcysts. Life size; sketch made
immediately after removal by operation.

licular distention and degeneration, and fibrous contraction, from that of the enlarged, swollen organ, with many dropsical follicles, shown in Plate IV, to the greatly atrophied one in which the thickened and wrinkled tunic, with substitution of fibrous tissue for the normal parenchyma, imitated the normal conditions of old age.

More frequently the condition has been a mixed one, the ovary on section still presenting some areas of unchanged glandular substance, with multiple cysts varying in size from a bird-shot to a filbert, and much increase in the amount of

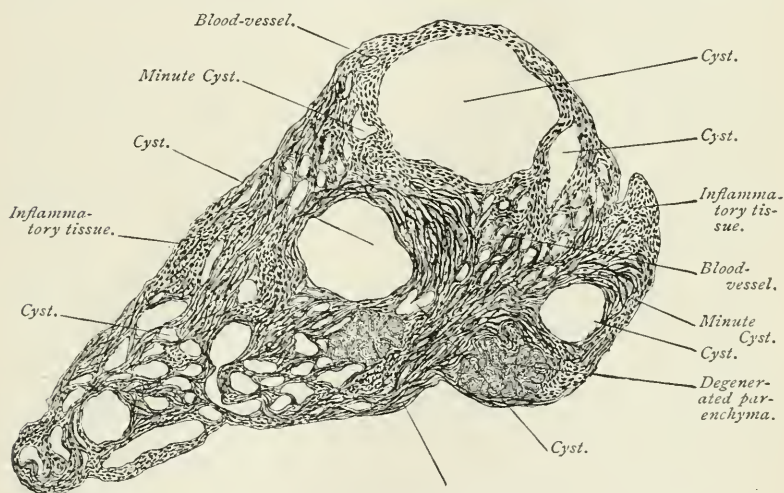


FIG. 9.—Sclerosis of ovary, with microcystic degeneration. Enlarged two and a half diameters.

fibrous stroma, and with more or less diffuse infiltration of inflammatory cells, and with marked thickening of the external enclosing fibrous tunic. Fig. 9, from a section of such an ovary, enlarged two and a half diameters, exhibits well the changes mentioned.

But a marked difference from the conditions attending the cases of infective ovaritis has been the absence of adhesions or other evidences of inflammation of the adjacent peritoneal surfaces; the Fallopian tubes are patent, and the fimbriated pavilion of each is open, supple, and mobile. One

case should be mentioned in which a different condition existed. In this case both ovaries were the seat of multilocular cystic degeneration, and some of the cysts in each had become so distended that each organ was as large as a lemon; both ovaries had contracted firm adhesions with the uterus and the rectum. The patient was an unmarried girl of twenty-six years of age; there was no history of infection; no metritis nor salpingitis. The degenerated ovaries were enucleated from their adhesions without other accident than the rupture of some of the cysts, and the abdominal incision was closed without drainage. An unusual rapidity of the pulse manifested itself on the second day, with a rising temperature, but without the other usual signs of peritonitis. This condition culminated on the fourth day in a fatal collapse. Autopsy revealed some two ounces of bloody serum in the pelvic cavity, with marked congestion of the adjacent peritoneal surfaces. This is the only death among this group of cases.

Of the entire number, nineteen were less than thirty years of age; twenty-two were unmarried, and four, though married, were childless; one had borne four children, but the inception of her symptoms dated back to her young womanhood, before marriage, and the local conditions when exposed by operation were identical with those found in the other cases. In most of these cases there was a spongy and relaxed condition of the endometrium, with leucorrhœa; in a large proportion of them a tendency to flexion of the uterus was present, most frequently ante flexion, only rarely retro flexion.

The amount of pelvic pain complained of by these patients was always out of all proportion to any gross departures from the normal condition of the pelvic organs that could be appreciated upon examination. Uniformly they have asserted that they were never free from pain, a pain which was so increased by being upon the feet for any length of time that they were shut out from the ordinary activities and pleasures of life. At the menstrual periods this pain was

always intensified, and in many cases was so extreme as to induce convulsive attacks or other acute hysterical manifestations, and to call for the exhibition of large doses of narcotics to relieve it. In several of the cases the opium habit had been contracted. In two of them a confirmed epilepsy had developed. Headache and backache were usually constant and much complained of. Obstinate constipation has been a frequent concomitant, and crises of retching and vomiting have been frequent, although in most cases the general body nutrition has been good.

Certain mental and moral peculiarities have seemed to characterize these cases as a class: they are typical neurasthenics; morbid in their views of all the affairs of life; often presenting considerable intellectual brightness; dwelling with great minuteness upon all the varying phases of their own aches and pains; feeding upon the sympathy and making constant demands upon the forbearance and attentions of those about them. They are prone to be very devout, and readily fall into the language of resignation and faith. Their condition suggests the presence in the body of some influence, powerful and pervasive, which is perverting it from the normal standard. This perverting influence is evidently generated in the diseased ovary and is but one evidence of the important part in woman's life that the ovarian impulse plays. The broad term "reflex neuroses" which has been employed to explain these distantly diffused phenomena seems to me entirely inadequate, and really meaningless when applied to them. It seems to me that the phenomena attending these cases of ovarian sclerosis, together with those accompanying the normal climacteric, and those which follow total ablation of the ovaries in earlier life, best square with the physiological hypothesis that the ovaries, in addition to their function in ovulation, produce and add to the blood some special product which is necessary to the proper balance of the nervous system, which originates, guides, and maintains the special sexual characteristics of woman. If this view is correct, it gives added importance to attempts at the

retention of as much of this ovarian influence as possible in the course of surgical procedures for the relief of pelvic disorders.

In cases of chronic idiopathic ovaritis vaginal examination always elicits tenderness on pressure against the ovary or ovaries; in some cases nothing abnormal in the contour, size, or location of the organ can be made out; more frequently it is displaced downward behind the uterus and may readily be felt, irregular in outline from the protruding cysts, enlarged, and very tender to the touch.

Nothing in the history of the cases that have come under my own examination has appeared to satisfactorily explain the genesis of this affection. It is a trophic disturbance, usually it manifests itself soon after the special developmental impulse of puberty is experienced. The conditions are suggestive of a central nervous lesion resulting in defective innervation and secondary circulatory and nutritive changes in the ovaries.

Different degrees of departure from the normal standard appear in different cases as measured by the local pain and the general nervous reaction. In the lesser degrees some advantage from hygienic and medicinal treatment may be hoped for. The stimulus of the married state and the trophic changes incident to childbearing seem to arrest the process or favorably modify it in some instances. Naturally the cases which apply for hospital treatment are made up chiefly of the intractable and extreme cases, and the hospital surgeon finds that in a very large proportion of his cases nothing short of total extirpation of the diseased organs suffices to bring relief to the omnipresent pain which is the urgent indication that clamors for his interference. The details of a single case may suffice as an illustration.

A girl, twenty years of age, was admitted in September, 1893, with the history that from the beginning of her menstrual life, at thirteen, she had always suffered from dysmenorrhœa, and that with added years there had developed constant pain in the

sacral and in the left ovarian regions. She suffered much from headache and from obstinate constipation. The uterus was strongly anteflexed; the endometrium was congested and spongy, and there was an area of erosion about the os externum.

Dilatation and curettage of the uterine canal and a plastic on the anterior fornix for retrocession of the cervix were done. Seventeen days later the menstrual flow occurred; it was more profuse than usual, and was attended with but little pain. Ten days later she was discharged improved. Two months later she returned, her former symptoms having recurred with all their original force. A second curettage was done, and a V-shaped section excised from the posterior lip of the cervix.

The next following menstrual period was painless and the patient was again discharged, improved. Ten months later the girl again returned to the hospital suffering as much as ever. Frequent attacks of pain in the intervals between the menstrual crises were being experienced, so severe as to call for increasing doses of morphine to render them endurable. Even a short walk would excite an attack of severe and lasting ovarian pain. Accordingly, in October, 1894, the abdomen was opened and the right ovary, which was found to be the subject of marked sclerocystic degeneration, was removed, and the remaining ovary, less diseased, was subjected to partial excision. She made a smooth recovery from this operation, and experienced at first decided relief from her sufferings. Within six months, however, she reported that her old attacks had again begun to appear with undiminished severity. She bore her condition as well as possible until more than a year had elapsed, when she again appeared, declaring that her pain was intolerable, being greater than at any time previous. Again the abdomen was opened and the remnant of the ovary that had been retained, together with its tube, which was thickened and congested, was removed. This was done December 9, 1895. Again she made an uneventful recovery from the operation. She was retained under observation some weeks longer than usual on account of her obstinate constipation. In February she finally returned to her home. Three months later she wrote that she was working regularly; that she was keeping up quite well, and was thankful to be as well as she was. In December, 1897, two years after the final total extirpation of all ovarian tissue, in reply to a note of in-

quiry she states that she is still very well; she has gained twenty pounds in weight, and can walk more than she had ever been able to since she was twelve years old. Her chief trouble is with the sluggishness of her bowels, and a headache about twice a month.

Fortunately not all cases are as inveterate as the one just detailed, and a place is left in the therapeutics of this affection for the less radical measures of dilatation and curettage of the endometrium, the local depleting effects of vaginal tampons saturated with boroglyceride and ichthyol, the counter-irritating effect of blisters and iodine to the inguinal regions, and the internal resolvent action of muriate of ammonia and of iodide of potash. The essentially chronic nature of the affection makes it possible and proper in many cases for the surgeon to give due trial to these palliative measures before resorting to the more radical procedure of castration. I find that, of the twenty-seven cases under examination, in fourteen the treatment was limited to these minor surgical measures. All experienced temporary improvement; the later condition of most is not known, but in three cases, at least, it is known that a permanent relief was secured; that a fair degree of good health was restored, and that they have since married and borne children.

Of the remaining cases, in eight both ovaries, with their tubes, were totally removed; in two, one ovary and tube only was removed; in one, total removal of one ovary and partial resection of the other was done; in one partial resection of both ovaries, and in one partial resection of one ovary only. The only fatality attending these operations has already been described. The ultimate results of the few in which the more conservative proceeding of resection was adopted is yet to be demonstrated. The immediate relief, professed by the patients, has not been so marked as that which has attended the same procedure in the cases of ovaritis due to infection from the tubes.

Cystomata.—Twenty-five cases of ovarian cystoma were submitted to operation. Of these, eleven were monolocular

cysts; seven were multilocular adenocysts; three were papillomatous cysts, and four were dermoid cysts. In each group there was one death, with an additional one among the adenocysts,—five in all. The causes of death were in two cases the *shock* of operation in patients already exhausted; in one case acute anæmia from post-operative hæmorrhage due to the slipping of the ligature from the stump of the pedicle; in one case to obstruction of the bowels from angulation caused by adhesion of a knuckle of the ileum to the raw surface left after enucleation of an adherent cyst; and, finally, in one case to tetanus. The tetanic symptoms developed on the fifth day after operation, and progressed to a fatal termination during the third day after they were first noted. The case had been a monocyst, containing two gallons of fluid. The operation had been uncomplicated, and the post-operative course had been favorable until the appearance of rigidity of the muscles of mastication on the morning of the fifth day. No clue to the source of infection was discovered. The woman was in fair health, fifty-three years of age, a resident of the eastern district of Brooklyn.

Treatment of the Pedicle.—It will be observed that among the entire number of operations necessitated by the various forms of ovarian disease there have occurred two deaths from the retraction of blood-vessels in pedicle stumps from the grasp of ligatures after the closure of the abdominal wound. In yet other instances that have not been named this accident occurred, but was discovered in time to be remedied before the production of fatal anæmia. As a result of these experiences hæmostasis *en masse*, by the use of a ligature encircling a clump of tissue made up of parts brought together with more or less tension, has been entirely abandoned, and there has been substituted therefor the slower and less brilliant but safer method of analyzing a pedicle into its component parts, and ligaturing them separately. In many instances it has been practicable to finish by drawing over the raw surfaces of these stumps folds of peritoneum, thus making an ideal disposition of the pedicle, providing against both

hæmorrhage and bowel angulation from adhesion, two fatalities from which latter cause have also been met with.

Size of the Cysts.—The general recognition of the comparative safety of operations for the removal of ovarian cysts, if done before the development of serious pressure disturbances of the kidneys and liver or the contraction of extensive adhesions, has served to bring to the operating-table during recent years most cysts, soon after they are first recognized, before they have attained great size. Two notable instances of extreme enlargement are, however, contained in this group of twenty-five cases. One was the case from which the photograph, reproduced in Plate I, Fig. C (page 336), was made. The woman was sixty-one years of age. For six years the gradually increasing distention of the abdomen had been borne with until it had reached the enormous dimensions shown in the illustration. She had lived in one of the interior counties of the State, at a distance from skilled medical advice. The growth, on removal, proved to be a multi-locular adenocyst, weighing thirty-seven pounds. Dense and extensive adhesions had formed with intestines and to abdominal wall, and a liberal slice of the abdominal wall was cut out still attached to the tumor. The subsequent convalescence of the patient was as absolutely uneventful as a normal childbirth.

In the second case, a woman, forty-six years of age, had noted the gradual development of an abdominal tumor for sixteen years, and had refused to submit to surgical relief, until finally it had filled the whole abdominal cavity, and, complicated with ascites, was producing marked and distressing cardiac, gastric, and respiratory disturbances. When admitted her heart was displaced upward and to the right, her lower limbs were œdematous, she was orthopnœic, and vomited all food almost immediately after taking it. She was greatly emaciated and exhausted. Her abdominal girth was forty-three inches; if unrelieved, death was imminent. After a week of preliminary treatment, including a tapping to relieve the most pronounced pressure symptoms, the abdomen

was opened, exposing a large, half-solid, half-cystic, multilocular growth, with friable walls, extensively adherent to intestines, omentum, and pelvic walls. Extreme shock, which developed early in the course of the operation, persisted after its completion, and terminated in death, one hour after her removal to bed.

One case each of suppurating cyst and of ecchymotic and necrotic cyst from twist of pedicle, recovered after removal of the cyst. The papillomatous cysts and the dermoid

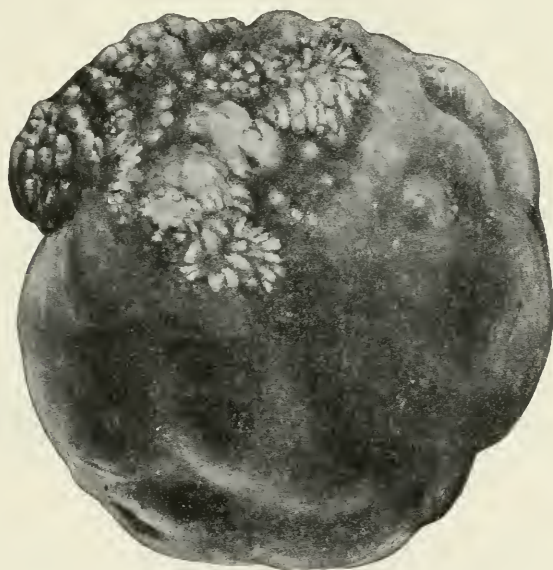


FIG. 10.—Papilloma of the broad ligament; cyst everted to show papillomatous growths.

cysts were all relatively small. The amount of pelvic pain and of disability provoked by these small cysts was in each case great, and out of all proportion to their size. The dermoid cysts averaged in size no larger than an ordinary orange. The papillomatous cysts were somewhat larger. The one shown in Fig. 11 was about the size of a cocoanut. The one shown in Fig. 10 is given of its normal dimensions. The amount of pelvic pain which it caused, notwithstanding its

small size, was sufficient to entirely incapacitate the woman from any active exertion.

MALIGNANT DISEASE OF THE OVARIES.

Carcinoma.—Three cases of primary carcinoma of the ovary have been observed in women, aged respectively forty-eight, forty-four, and twenty-five years. In the first the growth had already so extended into and involved the tissues of the iliac fossa and lateral walls of the pelvis as to be plainly inoperable, and no surgical interference was deemed advisable. The other two resembled in their gross character-

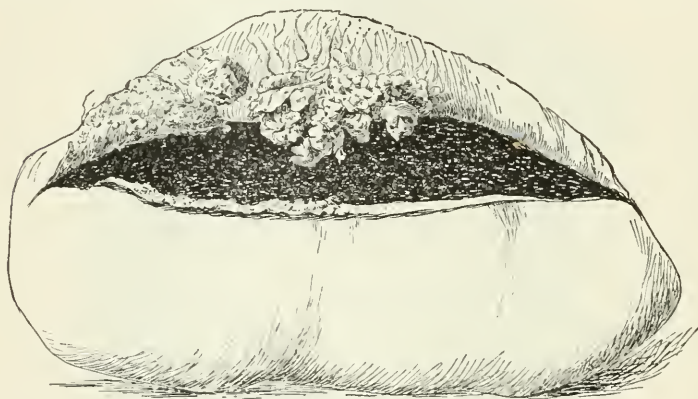


FIG. 11.—Papillomatous cyst of the ovary.

istics ordinary adenocysts, and not until their histological examination, made after removal, was their true character known. In both there were extensive adhesions, especially to the anterior abdominal wall. Both made uneventful recoveries from the operation. One enjoyed fair health for two years, when the advancing development of multiple metastatic deposits in various parts of the body began to disable her, and she finally died from general carcinosis three and a half years after operation. The second patient rapidly developed multiple nodules in the anterior abdominal wall, which displayed most remarkable activity of growth, converting the anterior abdominal wall into a revolting mass of

cancerous hummocks that quickly fell into necrosis, the process terminating in death by septic absorption and exhaustion within four months from the time of operation.

Sarcoma of both ovaries was met with in a woman thirty-seven years of age. She had borne three children, and had always enjoyed good health until the development of an ascites and failure of general strength caused her to seek advice. Examination detected marked solid enlargement of the ovaries. These were removed, together with the uterus to which they were closely adherent. At the time of the operation it was recognized that an infiltration extended into the adjacent tissues beyond the area possible to remove by the knife, and the incomplete nature of the extirpation was recorded. The ovaries themselves were each enlarged by cellular proliferation to the size of a duck's egg. Histological examination showed the growth to be a small, mixed-celled sarcoma. A smooth operative recovery ensued, and for six months she was so well that her friends laughed at the gloomy prognostication as to the future course of the case which had been given them. From this time, however, the presence of advancing disease became manifest, and by the end of the year she had died.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, December 8, 1897.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

TWO CASES OF AMPUTATION THROUGH THE HIP- JOINT.

DR. CHARLES K. BRIDDON presented the following cases:

CASE I.—M. P. A., aged fifteen years, single, electrician, American, was admitted to the Presbyterian Hospital March 13, 1897, with the following history: Three and a half months before admission he struck the inner side of his left knee against a post, causing a considerable amount of pain and tenderness for several days. Two weeks later he noticed a small, painless swelling on the inner side of the lower end of the left femur. This swelling gradually increased in size until three weeks ago, since which time its growth has been rapid. For three weeks there has been pain in the tumor, which is worse at night. It has also been somewhat tender to pressure. He has not limped, and has walked perfectly well. He has neither lost flesh nor strength and has always enjoyed excellent health. He has been on inunctions of mercury and increasing doses of potassium iodide, but these have not affected the growth of the tumor.

A physical examination revealed the following facts: The patient was well nourished; not anæmic; his thoracic and abdominal viscera were normal. The inguinal glands on both sides were palpable; the other superficial glands were not enlarged. The left knee-joint was swollen and enlarged and evidently contained sufficient fluid to cause the patella to float. The circumference of left knee was one and a half inches more than that of right knee. Seven inches above patella the left thigh shows atrophy of one inch in circumference, as compared with right thigh. No shortening of leg; no atrophy of calf.

On the inner aspect of the left thigh, at a level with the upper end of the patella, there was a tumor which was elastic to the feeling, not tense nor fluctuating. The skin over it was movable. The tumor was not movable upon the underlying tissues. There was no limp or pain in walking. Tumor is three by two inches and raised about an inch above the level of the surrounding tissues. The patient was observed for a week, and as the tumor was evidently increasing in size, a diagnosis of sarcoma was made and amputation at the hip advised.

On March 24 the patient was put under ether. The tumor was incised and a specimen given to the pathologist (who was present) for immediate examination. He at once reported it to be sarcoma of a malignant type. The incision was hastily closed with sutures and the instruments used for the purpose of examination discarded. An Esmarch bandage was applied to the leg (while elevated) from the toes to a point two inches below the knee. Hæmorrhage was controlled by Wyeth's method of pins, one passed in at a point two inches below the anterior superior spine and emerging posteriorly on a level with the great trochanter; another passed through the tissues on the inner aspect of the thigh from a point one inch below the crotch and emerging posteriorly. A pad four by two by two inches was placed over the femoral vessels as they emerged beneath Poupart's ligament, and this was held in place by six turns of heavy rubber tubing carried over the pad above the pins and around the thigh. This, as subsequently proved, absolutely controlled all hæmorrhage.

A circular incision, six inches below the tourniquet, was carried down to the muscle, and this was joined by a vertical incision beginning over the great trochanter and carried downward. A cuff composed of all tissues down to the muscles was next raised and reflected to a point on a level with the lesser trochanter, where a circular incision was carried through all the tissues down to the bone. The muscles were now raised from their attachment to the femur. On reaching the capsular ligament, an assistant placed it on the stretch by rotating and flexing the femur, while the operator quickly cut through it into the joint and completed the amputation.

The femoral vessels were seized and tied with silk, the remaining vessels with catgut. The sciatic nerve was drawn out and about an inch cut away. The tourniquet was then removed

and the few bleeding points remaining were caught and tied. The acetabulum was drained by a wick of iodoform gauze carried through the upper angle of the wound. The flaps (muscles and superficial tissues) were brought together with silkworm gut; the skin with catgut sutures. Copious dressing was applied. Practically no blood was lost and the patient suffered very little shock.

On the day following operation the patient had a pulse of 120 and a temperature of 102° F. On the third day his pulse fell to 90 and his temperature at the end of a week was normal. A few small doses of morphine and mild stimulation with strychnine and whiskey included his entire medication. The flaps healed by primary union. One week after the operation he was put on small doses of Fowler's solution, which were gradually increased to the point of toleration. On the eighteenth day he was out of bed and was discharged from the hospital cured.

The pathologist, Dr. Thacher, reported the tumor to be a sarcoma of spindle and giant cells, growing from and involving half of the thickness of the femur.

CASE II.—J. E. D., aged thirty-three years, single; clerk; native of Brooklyn. When eight years of age patient, as far as he knows, first had trouble with his left hip. At that time there were no abscesses, and he was treated at the Hospital for Ruptured and Crippled for twenty months. At the end of this period he was able to use his leg well, until sixteen months ago, when the same hip became sore and tender. There was much pain localized in the left knee. Abscesses began to form in the neighborhood of the hip, and the leg began to draw up. Six months ago he entered one of the large general hospitals of the city and was operated upon. At this time the head of the femur was found to be dislocated backward and firmly ankylosed; excision was thought impracticable, but a considerable portion of diseased bone was removed from the region of the trochanter major; one focus in the acetabulum was curetted and numerous abscesses were drained. He was in the hospital for three and a half months, but the sinuses had not healed, and he had not been able to use the limb to any extent. He did not improve in general health, and was advised on several occasions to have the leg amputated.

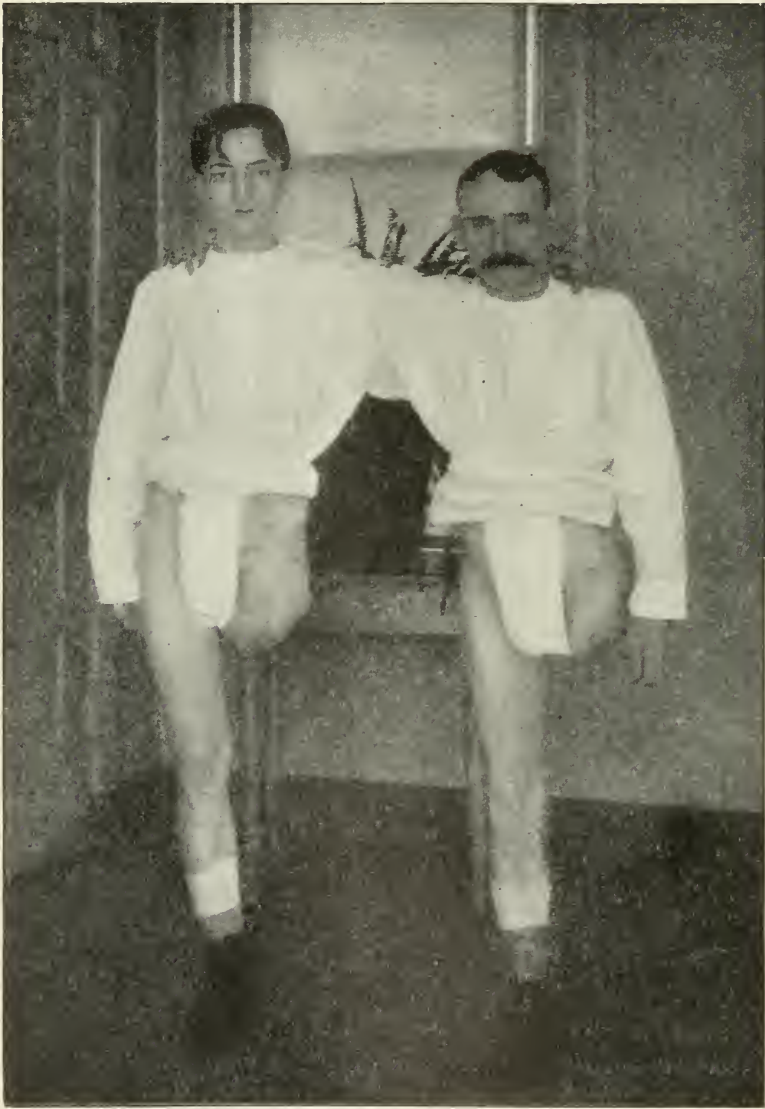
On admission to the hospital, February 4, 1897, the patient

appeared rather poorly nourished, anæmic, tongue slightly coated; heart normal. His lungs were negative excepting a few scattered sibilant and old pleuritic râles. The left hip was the site of an old inflammatory process; along the outer aspect there was a scar with two discharging sinuses; above these, four inches below the anterior superior spine, there was a second scar, also having a discharging sinus. The hip was ankylosed at an angle of 135 degrees. The left limb was extremely atrophied. A probe passed into the sinuses detects dead bone at distances varying from three to five inches from the surface. The urine was normal.

Preparatory to performing amputation, a few sinuses were opened more freely and were dressed each day with the hope of cleaning away some of the pus. On February 17, 1897, the patient was given ether and the limb removed at the hip-joint. The hæmorrhage was completely and satisfactorily controlled after the method of Wyeth. At a point five inches below the tourniquet a circular incision was made through skin and subcutaneous tissues. This was joined by a vertical incision from the trochanter major downward. The skin flap was reflected for a distance of two and a half inches, and at this point the muscles were divided down to the bone, and the vertical incision carried down to the bone. The only blood lost was a small amount from the limb below the incision. The muscles were now rapidly raised from their bony attachment, and the great trochanter and part of the neck exposed. On account of the firm ankylosis of the head it was found impossible to gain access to the joint; accordingly the neck of the femur was divided with a chisel, and the extremity removed. The head was next removed by means of the chisel exposing the remains of the acetabulum, which was found much diseased. On curetting this out, it was found continuous with a cavity within the pelvis, the disease having involved the whole thickness of the ilium.

The remains of the diseased capsule were cut away and the sinuses in the anterior flap thoroughly scraped. The vessels were now caught separately and tied with catgut and the tourniquet, and pins were removed. There was but slight oozing from the raw surfaces, and but one or two small arteries required ligation after the removal of the tourniquet. The muscles were approximated with catgut and the skin with silkworm gut, a

space being left at the upper and outer angle of the wound to allow the insertion of a drain to the acetabulum. Aseptic dressing applied, with moderate pressure.



Briddon's Cases of Amputation at the Hip-Joint.

The patient was sent to the ward in fair condition. A few hours later his pulse became somewhat weak and went up to 160, but it responded readily to rectal stimulation of hot salt solution and whiskey. Pain and restlessness were controlled by small doses of morphine.

For the six days following operation the temperature ranged from 101° to 104° F., and the pulse was above 140, but from this time on they rapidly improved and fell to normal.

Convalescence was slow and the sinuses were long in closing, the one leading to the acetabulum being open at the time of his discharge. His treatment consisted of nourishing food and alcoholic stimulation, principally in the form of Burgundy. On March 2 patient sat up in bed, and two weeks later he was about on crutches. He was discharged on June 4, a small sinus, two and a half inches deep, still remaining.

The pathologist reports that portions of the tissues about the hip show distinct tuberculous degeneration.

The accompanying figure shows the condition of these two men at the time of the report.

EXCISION OF THE ASTRAGALUS (BILATERAL) FOR TALIPES.

DR. BRIDDON presented an Italian girl, seven years old, who had been submitted to the operation of excision of the astragalus on both sides for double talipes equino-varus of the third degree, as illustrated by plaster casts exhibited to the society.

She had been attending an institute for the treatment of such deformities, during the whole of which time she had used the braces usually applied after tenotomies, but without result. Astragalectomy was done September 22, 1897, and the feet were maintained in good position with plaster of Paris, which was removed and reapplied on the ninth day; the second bandage was left on eighteen days, and was again put on for three weeks. The result is admirable; the child walks squarely on the feet, toes everted, and uses nothing for support but a strong shoe, built up one-quarter of an inch on the inner side.

CHOLEDOCHOTOMY.

DR. BRIDDON presented a woman, thirty-five years of age, who was admitted to the hospital for illness beginning ten weeks

before, with severe griping pain in the epigastrium, accompanied by chills, fever, vomiting, sweating, and the appearance of jaundice; the severe pain lasted for three days, and required the administration of opium; this was followed by a dull ache in the upper part of the abdomen on the right side, which region also became very tender to pressure.

The ache continued up to the time of admission, with varying intensity, and she had two exacerbations of very severe pain, similar to the original attack. The jaundice was marked and associated with itching of the skin. She was constipated and her stools were of a gray color. She was under observation in the service of Dr. Northrup in the medical ward of the hospital for one week, and was then transferred to the surgical division with the probable diagnosis of biliary calculi.

On admission to the surgical division on May 4, 1897, a physical examination revealed the following facts: She was thin and poorly nourished and markedly jaundiced. The tongue was coated, the superficial glands were not enlarged. The heart was forcible and regular, with a slight systolic murmur at the apex; not transmitted. The lungs were normal. The abdomen was soft, not distended. There was moderate tenderness on deep palpation in the epigastric and right hypochondriac regions. The liver percussed from the fourth space to the free costal margin, where the note became markedly tympanitic; its edge was felt one and a half inches below the costal margin in the mammary line. Spleen percussed normal; not felt. No distinct masses felt in abdomen, but at times it was thought that a small mass could be indistinctly felt in the region of the gall-bladder. The urine contained a trace of bile pigment, but was otherwise normal. Temperature, 98.8° F.; pulse, 96.

On the following day, May 5, under ether, an incision was made parallel to and one inch below the costal margin, five inches in length, with its centre opposite the junction of the eighth and ninth costal cartilages, thus opening the abdominal cavity. The great omentum was found adherent to the under border of the liver at the fissure for the gall-bladder. After careful ligation and division of the above adhesions, the stomach on the left side of the median line and the first portion of the duodenum were found approximated to the under surface of the liver, the gastro-hepatic omentum being very materially short-

ened. The gall-bladder exposed was small and normal in color, and through its wall could be felt hardened masses (movable on each other with smooth crepitus), entirely filling its cavity. Below and to the inner side, just above the duodenum, there was felt an additional hard rounded body quite freely movable upward towards the liver, palpation dislodged the body upward beyond the reach of the finger, it appeared to pass upward into the transverse fissure and not into the cystic duct. By manipulation it was made to resume its former position, and was subsequently extracted.

The gall-bladder being drawn upward by a tenaculum and the adjacent portion of the peritoneal cavity being carefully protected by pads, a longitudinal incision one and a half inches in length was made through its wall, which was of normal consistence but increased in thickness.

Through this orifice a large number of calculi were extracted, varying in size from a millet seed to a large-sized marble, the larger ones having facettied surfaces and of striated appearance. There escaped also a considerable amount of fluid bile, which was carefully caught and removed by sponges. After being thoroughly emptied the cavity of the gall-bladder was temporarily packed with a sponge, attention being directed to the hard body previously mentioned between the layers of the gastro-hepatic omentum.

A longitudinal incision was made over the body, parallel to the line of the duct, and a calculus the size of a marble removed from the common duct; some bile also escaped from the orifice. The finger introduced into the duct downward towards the duodenum distinctly felt the circular opening of the duct in the lumen of the gut. A soft rubber catheter was also passed into the duodenum as far as its third portion. The opening into the duct was then closed with a continuous Lembert suture of catgut and the gall-bladder orifice was closed in a similar manner.

The incision in the abdominal wall was closed by interrupted silkworm-gut sutures after the introduction of two small wicks of iodoform gauze, one to the line of the suture of the duct, the other to the similar line of suture in the gall-bladder. Copious dressing was applied, and the patient left the table in perfectly good condition, her pulse being 76.

Convalescence was uneventful, the pulse was never above

96, and the temperature, 101° F. for two days, fell to normal on the third day after moving the bowels with small, repeated doses of calomel and a saline.

The stools at first of a clay color gradually regained their normal appearance, and coincident with this the urine lost its bile pigment and the skin regained its normal hue, the latter, however, followed very slowly. For a week there was some escape of bile from the wound, at the end of this time this ceased and the wound entirely closed.

She was out of bed on May 29, and discharged in good health on June 1.

CHOLECYSTOTOMY.

DR. BRIDDON also presented a woman, forty-six years of age, who had always enjoyed good health, excepting for a slight tendency to rheumatism, until six days before her admission to the hospital. That evening, after having eaten a meal consisting largely of indigestible food, she began to have attacks of pain, cramp-like in character, situated just below the ensiform cartilage in the epigastric region. These pains continued during the night, and were accompanied by frequent vomiting of a bilious character. On the following day, the cramps and vomiting having subsided, she was up and out of bed, but she suffered from a continuous pain in the right iliac region, where the abdomen was also tender. This continued up to the date of her admission, November 16, 1896. She has had no chills and her bowels have moved once a day, and the day before admission, with the aid of a cathartic, she expelled a large amount of gas. Her appetite was good. She had not lost flesh or strength.

On admission a careful physical examination revealed the following facts: She was poorly nourished and somewhat anæmic. The thoracic viscera were normal. The inguinal glands of the right side were palpable; other superficial glands were not enlarged. Liver dulness was made out by percussion to extend from the fifth intercostal space to the free costal margin in the mammary line. A satisfactory attempt to feel the lower margin could not be made on account of the abdominal distention and tenderness. The spleen percussed normal, but could not be felt. The abdomen was distended, prominent, and tympanitic all over. There was extreme tenderness over the right side, preventing satisfactory palpation.

She was at once anæsthetized for the purpose of making a more thorough examination of the abdomen. On the right side of the abdomen there was felt an elongated mass, beginning in the region of McBurney's point. It was about two and a half inches in breadth and ran up to the edge of the liver, and then apparently inward for a distance of an inch towards the median line. It was somewhat hard, freely movable under the abdominal wall, and apparently lay in front of the kidney.

The urine which was passed after the administration of the ether contained 40 per cent. of albumen and many casts, no pus or blood. An absolute diagnosis was not made, and the patient was put to bed for further observation. She was carefully questioned in regard to jaundice and clay-colored stools, and, although very intelligent, could not recall any such symptoms.

Her bowels moved freely on the following day after oleum ricini. The stools were normal in color and contained neither blood nor mucus. On November 18 her abdominal distention had progressively increased and tenderness all over the right abdomen was exquisite.

Her temperature had steadily risen to 102° F., with no fall, her pulse was 108, and respiration 24. It was deemed best to make an operation, and she was etherized for that purpose. The abdomen was opened by an incision, six inches in length, in the right semilunar line, beginning above at the liver's edge. The omentum was found firmly adherent to the parietal peritoneum, and when these adhesions were broken through there was disclosed a space formed by omentum firmly adherent to the surrounding gut laterally and below, in which lay the lower edge of the liver (normal in size and appearance), and below it a much distended gall-bladder projecting downward, forward, and inward, to a transverse line drawn through the umbilicus, its wall dark in color, thickened, and covered with recent adhesions. The general peritoneal cavity, which had been necessarily opened in the manipulation of the gall-bladder, was carefully protected with gauze pads, and a trocar and canula were passed into the gall-bladder, allowing the escape of several ounces of thick, viscid, bile-stained fluid streaked with pus. The canula was withdrawn, and an incision two inches in length made in the anterior wall of the gall-bladder in the line of the incision in the abdominal wall. The wall was one-third of an inch in thickness, and

through the opening there escaped a large number (75 to 100) of small blackish calculi, varying in size from that of the head of a pin to a small pea, and with two larger calculi, each of which was faceted and the size of a large marble. The gall-bladder having been thoroughly cleaned out with sponges, a thorough search failed to reveal any calculi in the cystic or common ducts. This examination was somewhat impeded by the fact that the gastro-hepatic omentum was very short, and owing to the presence of adhesions, the examining finger could not be introduced into the foramen of Winslow; the first and second portions of the duodenum were covered with recent adhesions.

The wall of the gall-bladder was sutured to the edges of the parietal peritoneum with interrupted sutures of catgut and silk, thus affording free drainage for the gall-bladder. The abdominal wall below the fistulous opening thus formed was approximated with silkworm gut, space being left for a wick of iodoform gauze which permitted of drainage from this pocket. Drainage for the gall-bladder was obtained by means of two quarter-inch rubber tubes which protruded from the fistulous opening.

The patient practically sustained no shock from the operation, and suffered almost no pain. Recovery was uneventful. Feeding was commenced with fluids on the day after the operation and gradual additions made to the diet, until on the tenth day she was given a full house diet. The abdominal wound below the fistulous opening healed readily by granulation, the fistulous opening continued to discharge bile, diminishing in amount, until on the day of her discharge, six weeks after the operation, it admitted only the point of the scissors, and the bile discharge was estimated at about one ounce a day.

Dr. Thacher, having made a culture from the gall-bladder fluid obtained during the operation, reported a pure growth of *staphylococcus pyogenes aureus*.

During convalescence no abnormality in the stools occurred, either in amount, consistence, or color.

Dr. Briddon also presented three patients upon whom he had performed excision of the knee- and elbow-joints. In all these cases the results were very satisfactory.

CHOLECYSTOTOMY AND CARCINOMA OF THE PANCREAS.

DR. F. TILDEN BROWN presented a woman, thirty years old, who was admitted to the Presbyterian Hospital on August 15, 1897, with the following history: In March, 1897, she had first experienced attacks of pain in the epigastrium, which lasted for half an hour or more, and were at times very severe. The pain was associated with vomiting or gagging. She had never vomited blood. She was troubled with constipation, and after purgation she was apt to be free from her epigastric pain for a time. Blood was never noticed in the stools. Ten days previous to her admission to the hospital she had noticed that her skin was becoming yellow; since that time her stools were of a somewhat grayish color. Her temperature on admission was 102.5° F.; pulse, 80; respirations, 22.

A physical examination showed that the heart, lungs, and kidneys were normal. The area of liver percussion was small. There was no tenderness nor enlargement of the gall-bladder. There was considerable tenderness just below the costal arch, and extending to the left towards the spleen, which organ appeared to be normal. The patient's jaundice was fairly pronounced and the stools became clay-colored. She was put on a fluid diet, with a drachm of sodium phosphate every four hours, and morphine as required. Two days after her admission there was some pain in the abdomen, and the nurse reported that the stools contained an object which she had failed to keep, but which, from her description, suggested a biliary calculus. During the next ten days the patient's jaundice disappeared, and the temperature remained normal or subnormal. She was discharged on September 18, 1897, but readmitted three days later, suffering from a severe pain in the epigastrium. A tentative diagnosis of biliary calculus was made, and an operation performed. Under complete anæsthesia, palpation revealed a very small tumor between the normal position of the gall-bladder and the pancreas. An oblique incision, five inches long, was made parallel to the right costal cartilages, and on exposing the gall-bladder and pancreas digital examination revealed the presence of a small calculus in the gall-bladder, and a hard, moderately nodular

tumefaction of the head of the pancreas; this hardness extended along the pancreas as far as the finger could reach. The condition was regarded as a primary carcinoma of the pancreas. No calculi could be felt in the cystic, hepatic, or common ducts. The gall-bladder was sutured with silk to the peritoneum and a stone about the size and shape of an almond removed. The abdominal wound was then closed at both ends up to the opening in the gall-bladder, and the latter drained with iodoform gauze. The silk sutures were removed after seven days. The biliary fistula gradually grew smaller, and late in November it closed for two days. It then reopened and at intervals gave vent to a slight discharge of thin bile until two weeks ago. Now there is no evidence of a fistula. The patient states she is more comfortable when there is a discharge of bile through the sinus.

The patient has improved since the operation, but she still suffers from occasional attacks of great epigastric discomfort, with vomiting or gagging. She complains of a feeling as though she could not draw her breath. She has five or six loose stools daily. She eats all kinds of food, and states that her diet has no bearing upon her attacks of epigastric pain. The urine contains neither albumen nor sugar. The speaker said he did not know whether the stools contained undigested fat.

Was the hard nodular enlargement of much of the pancreas due to carcinomatous infiltrations, pancreatic calculi, or chronic inflammation extending from the common bile-duct due to irritation of slowly passed gall-stones?

DR. A. G. GERSTER said he was somewhat doubtful about the correctness of the diagnosis in the case shown by Dr. Brown, in view of the age of the patient and her apparent good health. While it was possible that the case was one of carcinoma of the pancreas, the probabilities were against that assumption. The nodular swelling of the pancreas which was made out on palpation might be the result of a simple inflammatory condition. Chronic inflammatory conditions of this organ have been frequently observed and described.

FRACTURE OF THE HEAD OF THE RADIUS.

DR. L. A. STIMSON showed a man, thirty-six years old, who, on October 26 last, fell from a truck and landed with his arm under him. The outer side of the injured elbow became very

much swollen. An examination showed that the ulna was displaced backward about half an inch, and that the head of the radius was probably fractured. Six weeks later he came under Dr. Stimson's care, with the elbow fixed at an angle of above 160 degrees, and rotation lost. An incision was made through the soft parts over the external condyle, and this incision almost immediately exposed the head of the radius, which had escaped from the joint, passing through the ligament. The head of the radius had been broken into several fragments, which were removed. There was also a fracture of the coronoid process of the ulna at its base, and the ulna itself was displaced a short distance backward. Rotation is now possible for about twenty degrees, and there is enough flexion to suggest that the joint in time will become fairly useful.

EXCLUSION OF SEGMENT OF INTESTINE FOR RELIEF OF FÆCAL FISTULA.

DR. FRED. KAMMERER showed a patient, a man, twenty-six years old, who had come under the speaker's observation in November, 1896. He had been ill for several years previously, and gave a history of having had many attacks of pain in the appendical region. An examination revealed the presence of a tumor as large as a fist in the right iliac region. There was indistinct fluctuation at a point about one inch above Poupart's ligament. An incision was made here, opening a small cavity, which contained a few ounces of pus. From this cavity a sinus, which barely admitted the finger, led in an upward direction towards McBurney's point. The small cavity was packed with gauze, and a few days later, while dressing the wound, a large quantity of pus escaped. A probe was thereupon introduced into the sinus, and now passed for six or eight inches along the inner pelvic wall into the right lumbar region, where the point of the instrument could be felt by external palpation. No necrosed bone could be discovered and the diagnosis still rested between a congestive abscess or chronic appendicitis.

On November 30 an incision was made posteriorly. This revealed a sinus running up to the diaphragm, and on introducing the finger a foreign body, which proved to be a typical fæcal concretion, was found at the end of the sinus, near the diaphragm.

The patient's general condition being poor, nothing further was done until January 20, 1897, when, the sinuses having failed to heal, a laparotomy was performed. The appendix was found lying behind the cæcum and removed with great difficulty, because of the dense, firm adhesions. On January 27 a fæcal fistula developed; the fistula was situated about three inches from the abdominal wall, and easily admitted the index-finger. Several ineffectual attempts were made to close the fistula, and the patient steadily lost ground, owing to contraction of the external fistulous opening, with consecutive retention and absorption of septic material. In April the abdomen was again opened, and the entire right iliac fossa was found to be occupied by a mass of firmly adherent intestines. After separating the omentum and as much of the intestines as was possible, a loop of the small intestine was seized. Both ends of this loop, which was about four feet long, disappeared within the mass of adhesions, and it was impossible to determine definitely the direction of the fæcal current in this loop. It could not, therefore, be utilized in the formation of an anastomosis. The duodenum was thereupon seized and the gut followed down to the point at which it also disappeared within the adhesions. At that point the gut was divided, its distal end was closed, and its proximal end implanted into the transverse colon with a Murphy button. From that time on the patient's condition began to improve. The fæcal stream was immediately diverted from its former course, very little regurgitation occurring. For a time the patient suffered from diarrhœa, but now he has only one movement a day, showing that the human economy can well adapt itself to changed conditions. Since the last operation the patient has gained thirty pounds in weight, and is able to earn his living. He still has a small fistula on the anterior wall of the abdomen, from which, now and then, a small quantity of discharge flows. The case again demonstrates the value of unilateral exclusion in some cases of fæcal fistula. Very little, if any, fæcal matter evidently passes into the excluded portion, and the latter, though more than six feet long, has not become the seat of irritation or inflammation from retained fæcal matter.

Dr. Kammerer showed a second patient, a man of forty-eight years, who had been operated upon elsewhere three times for appendicitis, and five times by the speaker for a large fæcal fistula, from which at first the discharge of all fæcal matter took

place. The case has been described in the *Medical Record* of February 20, 1897. During the summer of 1897 the speaker had finally been able to close the large fistulous opening in the ascending colon, and now the patient was perfectly well, although he carried in his abdomen six inches of ileum, the entire ascending and half of the transverse colon absolutely shut off in all directions.

DR. HOWARD LILIENTHAL said that in cases like the first one described by Dr. Kammerer, where the appendix is closely adherent to the intestine, he thought it advisable to split the peritoneal coating of the appendix, and then shell out the mucous and muscular layers rather than to attempt to dissect it free entirely. Such a procedure might have prevented the occurrence of the fæcal fistula.

DR. KAMMERER said that, although he was inclined to believe that the fæcal fistula in his first case developed on the spot where the appendix had been adherent, and was due, perhaps, to the severity of the manipulations that were found necessary to free it, yet he was very doubtful whether the procedure mentioned by Dr. Lilienthal would have been applicable in that case, as the appendix was very much thickened and could probably not have been shelled out from its peritoneal covering.

LARGE LUMBAR HERNIA FOLLOWING NEPHRORRHAPHY FOR FLOATING KIDNEY.

DR. ANDREW J. MCCOSH presented a patient, a seaman by occupation, who had been operated on twice for the relief of floating kidney, the first nephrorrhaphy being done in 1889, through a vertical lumbar incision. Following this operation he was perfectly well for a period of two and a half years, when, after a severe strain, his symptoms returned, and he submitted to a second operation done through an oblique incision. About six months after the second operation the patient noticed a bulging in the lumbar region, which gradually increased in size until it became as large as a child's head. The tumor proved to be a hernia, which was at times reducible, and then, again, for hours and days it remained irreducible. The patient complained of very severe colicky pains, and within a year and a half lost seventy pounds in weight.

In December, 1896, Dr. McCosh operated for the closure of the hernia, and for six months afterwards the patient re-

mained perfectly well, gaining eighty pounds in weight. Then, after a night of exposure and undue bodily exertion, a recurrence of the hernia occurred below the site of the previous one. For this he was operated on in a neighboring State, but no improvement followed, and the man still has his hernia, which at times attains the size of two fists. Since its recurrence he has lost over forty pounds.

Dr. McCosh said the hernial sac upon which he had operated contained colon and small intestine. The man's kidney was firmly attached to the tissues of the loin and to the periosteum of the twelfth rib. As far as the mobility of the kidney is concerned, the second nephrorrhaphy had proved a success.

LIGATION OF THE FIRST PART OF THE SUBCLAVIAN ARTERY.

DR. B. FARQUHAR CURTIS presented a patient, forty-two years old, a Swede, and a seaman by occupation, who was employed on one of the lines going to the Gulf of Mexico. Among his duties was that of "throwing the lead" for sounding, the lead weighed from six to eight pounds; after circling it around several times it was thrown and the line to which it was attached was played out through the fingers. This had to be repeated every few minutes, sometimes for several hours. About one year ago he first noticed pain in the shoulder, and for six months the pain had been severe, and he had noticed a tumor above the right clavicle. Gradually the right arm became swollen and painful until he almost lost the use of it. In July last, when the man entered St. Luke's Hospital, the arm was cedematous, and a pulsating tumor was felt above the outer half of the clavicle. The tumor was about the size of a hen's egg, and pulsated very distinctly. Nothing could be felt in the axilla, or on the inner side of the scalenus. There was a loud systolic bruit in the tumor and pulsation in the arteries beyond was much less than that on the other side.

Although the man gave a history of syphilis many years ago, his radial arteries were in fairly good condition, and it was not considered worth while to delay for antisypilitic treatment. The patient was very anæmic, but otherwise in good health.

The aneurism evidently sprang from the third portion of the subclavian. It seemed probable that the first portion of the artery

was in good condition, and it was therefore decided to pass a ligature around it, in spite of the fact that the history of this operation is a very unfavorable one.

The operation was done August 19, 1897, about four months ago, Dr. F. H. Markoe assisting, as follows: A vertical incision was made along the inner border of the sterno-cleido-mastoid muscle, which was then partially divided in order to get a better exposure. The sternal end of the clavicle was then detached subperiosteally and, by dividing the sterno-clavicular ligaments, was turned out of the way. The artery, when exposed, was found healthy right up to the inner border of the scalenus anticus muscle. Two chromicized catgut ligatures were then passed around the artery, about one-eighth of an inch from the thyroid axis. The ligatures were placed in contact and tied tight enough to occlude the vessel, without dividing the coats, following the method described by Ballance-Edmunds. The clavicle was then turned back into its normal position and anchored to the sternum by chromicized catgut. The wound was closed without drainage, and healed by first intention, the patient's temperature not rising above normal.

Pulsation in the aneurism ceased immediately after the ligation. The circulation was normal in the fingers within twenty-four hours after the operation, and the man has since remained perfectly well. The clavicle is rather loose and the sternal end greatly thickened by new production of bone under the loosened periosteum.

Dr. Curtis said that, so far as he knew, the above was the first case on record in which the first part of the subclavian artery had been successfully tied in continuity by modern methods. The speaker thought that the success of the operation in this case was largely due to the Ballance-Edmunds method of ligation which had been employed. According to Souchon's carefully collected statistics there have been sixteen cases (all but two on the right side) with sixteen deaths,—in two cases the carotid being also secured. Mitchell Banks almost succeeded, his patient living for a month, when a fatal secondary hæmorrhage occurred through a sinus leading to the ligature. In this enumeration we do not include Halsted's successful case of preliminary ligation of the left subclavian before extirpation of a large axillary aneurism. All of the deaths have been due to secondary hæmorrhage

or other septic complications. The catgut employed has been found in other wounds to last five weeks at least without much change, and it is hoped that the obliteration will be permanent. We have carried the operation through successfully, and time only can tell whether the cure will be definite.

DR. L. A. STIMSON said that he thought it would be a mistake to assume that the method of ligation resorted to by Dr. Curtis was the only safe one that could have been employed to occlude the artery in the neighborhood of so large a branch as the thyroid axis. The speaker said that certain experiments in this direction had convinced him that the common idea regarding the action of a wide ligature about an artery is quite illusory. Even if it does not sever the inner and middle coats, it so compresses them that it produces a molecular absorption of the vessel walls within the loop, which is practically identical with the division resulting from a ligature drawn tightly enough to break them.

DR. DAWBARN said that while the case was certainly a brilliant success, he doubted whether the Ballance-Edmunds "stay-knot," which Dr. Curtis had used, was an important factor. These authors had especially recommended this knot only with the use of dentists' twisted (floss) silk, which tied flat, like a narrow tape. Dr. Curtis had instead used catgut; and probably the ordinary "surgeon's knot" would have done as well.

DR. CURTIS replied that, while he agreed with Dr. Stimson regarding the change produced in the arterial walls by ligation in general, it appeared to him that the change would be brought about much more slowly by the newer method of ligation than by the former ones, and if sepsis occurred, the danger would be far greater in the latter case.

CONTRIBUTION TO THE SURGERY OF THE PELVIS OF THE KIDNEY.

DR. C. K. BRIDGON read a paper with the above title, for which see page 416.

DR. KAMMERER said that in one case of intermittent hydronephrosis, upon which he had operated, the attacks came on at varying intervals, at first at long intervals, later on very frequently. In that case he found it necessary to remove the affected kidney, as the entire substance of the organ, together with

the pelvis, had been converted into one large sac. In such a case, where scarcely any kidney substance remains, it is doubtful whether anything can be accomplished by conservative treatment, although very good authorities can be quoted who oppose nephrectomy even in extreme instances where only a sac or shell of the kidney is found.

DR. STIMSON said that not all cases of intermittent hydronephrosis are in a position to avail themselves of an operation. During the paroxysms relief can usually be afforded by elevating the hips and lowering the shoulders.

DR. A. G. GERSTER exhibited a calculus which had its origin in the pelvis of the kidney of a man who for many years suffered from attacks of intermittent hydronephrosis. Ultimately the kidney degenerated and an alveolar sarcoma developed. Nephrectomy was performed, and this large stone was found in the pelvis of the organ. The stone was about the size of a hen's egg, and weighed three ounces and one drachm. By obstructing the orifice of the ureter it had no doubt caused the patient's frequent attacks of hydronephrosis.

INTESTINAL ANASTOMOSIS BY MEANS OF A POTATO BUTTON.

DR. STIMSON reported the case of a woman, sixty-eight years of age, upon whom he had operated for the relief of a strangulated femoral hernia. A loop of intestine, about three inches in length, was found to be in a gangrenous condition and had to be cut away. The two divided ends of gut were then united over a button which had been carved out of a raw potato. The shape of the button was that of two truncated cones, placed base to base, with an equatorial groove and a longitudinal central canal. The speaker said that a raw potato can be fashioned into one of these buttons in a few minutes' time with a knife or gouge.

Dr. Stimson said he had employed this method of intestinal anastomosis in six cases, with two recoveries. In both of the latter cases the operation had been done for strangulated hernia. In one case—also for strangulated hernia—the patient died in about forty-eight hours, and at the autopsy perfect union of the divided ends of the gut was found while the button had disappeared. In the other three cases death followed too promptly after the operation to leave time to show the efficiency of the button.

DR. ROBERT H. M. DAWBARN said that Dr. Stimson, in crediting the use of raw potato in anastomosis to Landerer, overlooked the fact that the speaker first suggested had used this, especially in lateral anastomosis, a number of years ago. His first article upon raw vegetable tissue for such purposes was published in the *New York Medical Record*, for June 27, 1891. Raw potato remains longest unchanged in the stomach, as the secretions of that organ naturally do not attack starch. The experiments also showed that even in the small intestines the potato plates remained unchanged long enough to accomplish the purpose for which they were introduced; and that they usually began to soften within twenty-four hours.

The speaker said he failed to see that this potato-button method of Landerer possessed any advantage over end-to-end anastomosis, without the use of any foreign body, provided the best method of end-to-end anastomosis be used. Dr. Dawbarn was satisfied that a method of his own, whereby the anastomosis can be safely completed within three minutes' time, and without the aid of any foreign body, is a distinct advance. This is to be described shortly in Dr. Bryant's new edition of his operative surgery.

EDITORIAL ARTICLE.

RIEDER ON THE PATHOLOGY AND TREATMENT OF RECTAL STRICTURES.¹

RIEDER has examined preparations obtained during operation from seventeen cases. Guided by Goldmann's researches into the part played by the vessels in carcinomata, his attention was from the first directed specially towards these structures. An unpublished method of staining elastic elements, invented by Weigert, was of the highest value. By this means blood- and lymph-vessels were shown with a beauty and completeness never possible before. The author endeavors to answer two questions as a result of his investigations.

Question 1. Is there such a thing as a syphilitic stricture of the rectum? Are criteria at our command which permit the recognition of the luetic nature of the lesion by microscopic examination?

Question 2. Why is the affection so much more common in women than in men?

In 1895 operation was performed on a forty-two-year-old woman. Numerous secondary and tertiary lesions were present; especially noted was a tertiary ulcer beside the urinary meatus. There were recent rectal ulceration and slight stenosis of a few weeks' duration. The specimen obtained represented the earliest stage of the disease. A superficial loss of substance was found about four centimetres above the anus. This involved the whole of the rectum from side to side and was itself about the width of a finger. From its two extremities branches came down to the

¹ Dr. R. Rieder, Privat-docent in Bonn, *Archiv für klinische Chirurgie*, Band lv, S. 730.

anus. In the upper third normal mucous membrane was visible, but in this, even, there were two small ulcers. Microscopic examination showed (1) normal arteries; (2) markedly diseased veins; (3) a chronic inflammatory cellular infiltration of all the layers of the gut wall. The cellular infiltration (a kind of granulation tissue) was partly diffuse and partly circumscribed. It consisted of round cells, epithelioid cells, and giant cells. It showed a reticular stroma, and both in origin and distribution corresponded exactly to the disease of the vessels. Staining the elastic fibres permitted recognition of remnants of vessel walls in numerous masses of cells. Many of the masses of cells were in fact nothing but vessels whose lumens were destroyed, and which had been transformed into neoplasm by a process of peri-, meso-, and endovascular changes. *This process was always confined to the veins, the arteries were normal.* At another spot there was a large collection of cells in which three different parts could be distinguished. In the middle of one part there was a gaping, intact, and sharply defined artery, while in the two other parts there were the two veins which accompany the artery. These veins still retained their normal relationships, but at one spot the cellular infiltration surrounding them had broken through the venous wall and penetrated the lumen. Of course, this chronic inflammation did not affect all the veins, but most of them had, at least, thickened walls. The thickening was almost exclusively due to connective-tissue proliferation in the subendothelial intima, and was often so extensive that the lumen was obliterated. The hæmorrhoidal veins were specially subject to attack. Scarcely one of them could be found which did not show great thickening of the fibrous tunica intima; not uncommonly they were completely closed.

In the preparations examined the name gumma was confined to sharply defined foci of cells which showed no connection with the vascular system. They consisted of a peripheral zone of lymphoid cells lying close together, and of a centre which ap-

peared clear, under the low power. The centre was composed of epithelioid, multinuclear, and giant cells. They showed no tendency to caseate, while in contrast to tubercles they exhibited many capillaries and small vessels. There was a stroma of delicate fibres well developed in the periphery, while in the centre not clearly demonstrable by stains.

The next case, operated upon in 1893, was in an advanced stage of the disease, and had a fully developed stenosis.

The patient, thirty-one years of age, had been a *puella publica*, and had for years been treated for primary and secondary lesions. She was very much reduced and suffered from *incontinentia alvi*. The rectal ulceration involved the anus, which was removed during the operation. Histological examination gave the same results as in the preceding case, only the process was older and there was more connective tissue. Not only were all the coats of the gut involved, they were more intensely diseased, more greatly infiltrated. The mucosa was absent, the submucosa in many places existed only as a thin connective tissue and cellular layer, in the absence of which the muscular layers would have been exposed. Again, in other places the submucosa did not merely consist, as in the former case, of a delicate net-work in whose meshes lay round and polygonal cells, but it consisted of masses of cells generally in a callous bed of connective tissue. Miliary gummata also existed in the submucosa.

These neoplasms had nothing to do with vessels, on the contrary, by means of the elastic fibre stain, numerous veins could be recognized, *completely obliterated* by connective tissue, and which were so hidden in connective tissue and cellular infiltration that they were undemonstrable by other methods of staining. The elastic constituents of the venous walls were much thickened, even small veins often showing very thick bundles of elastic fibres. The arteries were generally normal, only here and there were there slight arteriosclerotic changes. Venosclerosis was most marked at the lower end of the rectum.

Many of the hæmorrhoidal veins were so thoroughly closed by connective tissue that without the coloring of the elastic fibres they could scarcely have been recognized. The destructiveness of the disease was best seen in the muscularis. Both muscular coats were in parts totally destroyed and replaced by cell infiltration and connective tissue. Gummata were present inside the muscular bundles, and in the perirectal tissues. The inflammatory process and venous disease were well marked in the perirectal fat.

After the death of the patient, specimens from other lesions showed the same characteristic chronic inflammation and sclerosis of the venous intima. Endarteritis, when present, was of secondary importance.

The last stage of rectal stricture was demonstrated by a preparation provided by a prostitute who had been treated, in the syphilitic clinic, from her seventeenth to her thirty-first year. Here the microscopic examination showed practically nothing but scar. Callous connective tissue overlay the muscularis, which in parts was replaced by connective tissue. There were practically no vessels except some arteriosclerotic arteries and pathologically dilated veins. Here and there the elastic fibre stain permitted the recognition of an obliterated vein. The most striking feature was the enormous new formation of elastic fibres, especially in the peri- and pararectal tissues. The newly formed connective tissue was mostly elastic.

The feature of these three illustrative cases is the marked venous disease in contrast to the almost complete absence of arterial disease.

En résumé.—The veins may be diseased in two ways.

(1) We find an endophlebitis, characterized by development of the cells of the intima and often accompanied by peri- and mesophlebitis. The intima may remain intact and the disease may consist in a nodular periphlebitis or the surrounding cellular infiltration (granulation tissue) may penetrate the lumen of the vein.

(2) We find the stratum subendotheliale intimæ changed into a thick fibrous layer. This occurs in veins whose walls are free from other inflammatory or pathological conditions.

To neither of these forms can specific importance be attributed. The first is merely an inflammatory alteration capable of being aroused by any of the causes of inflammation, though in ordinary inflammation the arteries and veins are equally involved.

The second form which may be designated "venosclerosis syphilitica" appears more unusual. The author has, however, persuaded himself from special researches that it can be caused by other pathological processes. From books on pathological anatomy there is little to be learned on disease of the veins, as these vessels are treated as mere appendages to the arteries. Rieder has, therefore, made a study of the influence of syphilis on the veins in general. He is of the opinion that, apart from the very marked lymphatic affections, syphilis shows a preference for attacking the veins both in the primary and secondary stages. The lesions produced are peri- and mesophlebitis, but, above all, marked endophlebitis, sometimes cellular, sometimes fibrous, in nature. Both inside and outside areas of inflammation it is not very rare to find a sclerosis of the venous intima even in large vessels, and this sclerosis is unconnected with any other inflammatory alteration. Newly formed inflammatory granulation tissue occasionally breaks through a vein wall, and so gains immediate access to the lumen. Even the large subcutaneous veins of the inguinal region, their walls remaining intact, can become the seat of a marked endophlebitis.

With very few exceptions the large arteries remain intact, so far as their intima is concerned, in all fresh cases. If small and very small arteries lie in newly formed granulation tissue then their adventitia and perhaps media become affected, but even then the lumen is almost always evident. If it is not patent the closure is due to pressure from the outside, without any

proliferation of the cells of the intima,—*i.e.*, without an endarteritis being to blame. In the veins the endophlebitis is the rule. In the tertiary period, especially in the neighborhood of gummata, endophlebitis syphilitica often reaches its highest degrees, while the arteries can remain intact. If we consider the larger vessels we can say that the syphilitic process shows a marked preference for the venous system, and the arterial system can remain unaffected for a long time.

Venous involvement early in the disease is of practical interest. If we see the veins of the skin filled with a cellular infiltration, which probably is the bearer of the syphilitic virus, if we see how newly formed and inflamed tissues press into the lumen of veins, then we can recognize not only that local but that general dissemination of the disease may take place through this route, as was established years ago by Auspitz and Unna. We readily understand how the hard sore practically always occasions general infection and how excision of the primary sore no more saves the patient than does the disinfection or excision of an infected sore preserve a patient from pyæmia, once the necessary poison has gained access to the venous circulation. The reason why syphilitic stricture of the rectum is much more common in women than in men is found in the anatomy of the parts. In women the lower group of rectal veins anastomose directly with the external pudendal, which arises from the posterior vulvar commissure. This commissure is not rarely the site of a primary sore and of secondary but more especially of tertiary lesions. In man the syphilitic poison, when taken up by the veins, has to take a roundabout course through the vesical plexus before it can go from the foreskin or glans to the rectal vessels. In women the syphilitic virus taken up by the vulvar plexus is at once carried into the hæmorrhoidal veins. The author ends this part of his paper by coming to the following conclusions:

- (1) Syphilitic stricture of the rectum does exist.
- (2) It arises from the blood-vessels (perhaps also from the lymphatics).
- (3) This origin is the cause of its relative frequency among women.

JOHN F. BINNIE.

REVIEWS OF BOOKS.

TRANSACTIONS OF THE AMERICAN ORTHOPÆDIC ASSOCIATION.
Volume x.

This neatly gotten up and well-edited book contains the transactions of the eleventh session of the association, which was held at Washington in May, 1897. There are thirty-two papers with their discussions. Unlike the papers read before many of the special societies, all of these deal distinctly with subjects orthopædic in character.

One of the papers is on "An Englishman's Views of Orthopædic Surgery as practised in America," by Noble Smith, of London. This paper is a remarkably politic piece of rhetoric. The American orthopædist, reading this, biased in his own favor, as he would be by the title, would get the impression that the Englishman regarded him as a very clever fellow. But upon critically reviewing the article he would find that the language is so arranged that Noble Smith would have no trouble whatever in showing that he had not suggested that the Americans even equalled the English as orthopædic surgeons.

A very interesting and rather unusual paper is "The Human Foot in Art," by Dr. E. H. Bradford. The whole book is well printed, and does the association much credit.

JAMES P. WARBASSE.

FURTHER OBSERVATIONS REGARDING THE
USE OF THE BONE-CLAMP IN UNUNITED
FRACTURES, FRACTURES WITH MALUNION,
AND RECENT FRACTURES WITH A TEN-
DENCY TO DISPLACEMENT.

BY CLAYTON PARKHILL, M.D.,

OF DENVER, COL.

IN the history of our profession a very important chapter has been devoted to the fracture of bones. No subject, perhaps, has received more attention. No department of our art has demanded a more ready and accurate anatomical knowledge, or such finished mechanical skill. No surgeon, however accomplished, but has met with cases the treatment of which has taxed his ability to the utmost, and few with any extended experience, but have left monuments to their want of success. Many conditions, such as muscular action, interposition of tissue fragments, blood-clots, irregular, oblique, and multiple lines of fracture militate against accurate approximation of the fragments in fractures of the long bones. These may not only prevent adjustment in the reduction of the fractures, but also their sound and symmetrical union. Accurate adjustment and perfect fixation are the ends sought for in treatment. The numerous cases of pseudarthrosis and malunion show how inefficient the treatment has been. No result can be more mortifying to a surgeon than the failure to get union, and none can proclaim so loudly and persistently his lack of skill as a union with deformity. External appliances, in the way of splints and fixed dressings, such as plaster of Paris, etc., have formed the usual

procedure for the fixation of fractures with a tendency to displacement, until recent years. Even in compound fractures with large openings through the soft tissues, dependence has been placed to a very large extent upon these methods of treatment. Modern surgical technique should now be sufficiently perfect to warrant a bolder method when necessary, and the securing of accurate and permanent fixa-

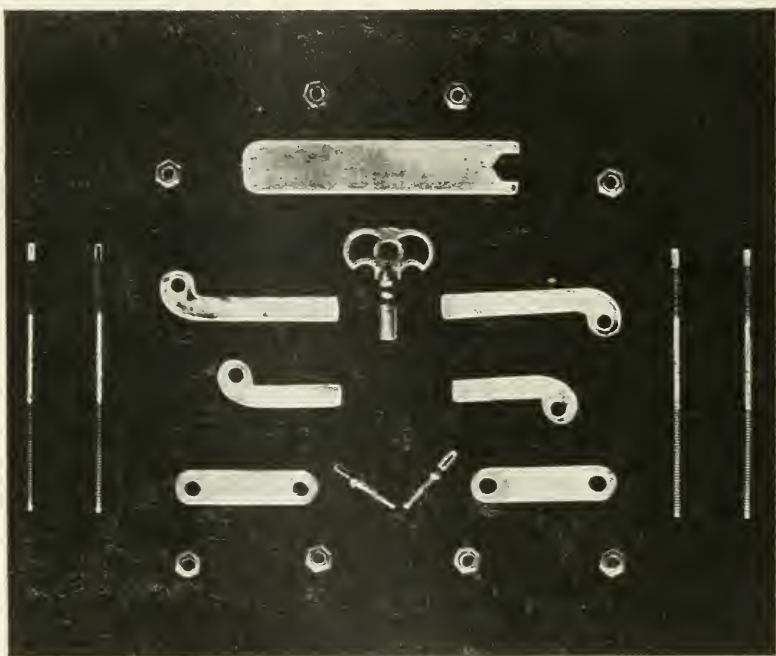


FIG. 1.—Separate pieces of clamp.

tion of the fragments. In certain selected cases this should apply to simple as well as compound injuries.

The great number of mechanical appliances for securing fixation in cases of pseudarthrosis is sufficient in itself to show how imperfectly any of the methods have answered the purpose. These might, for convenience of study, be arranged in three classes.

In the first class we would put those which contemplate leaving the materials used for uniting the fragments perma-

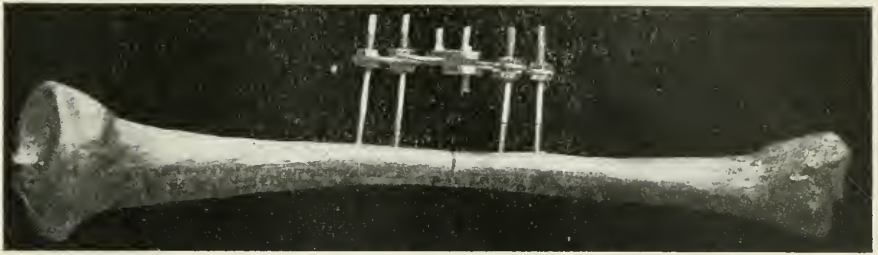


FIG. 2.—Side view of clamp in tibia.



FIG. 3.—Top view of clamp in tibia.

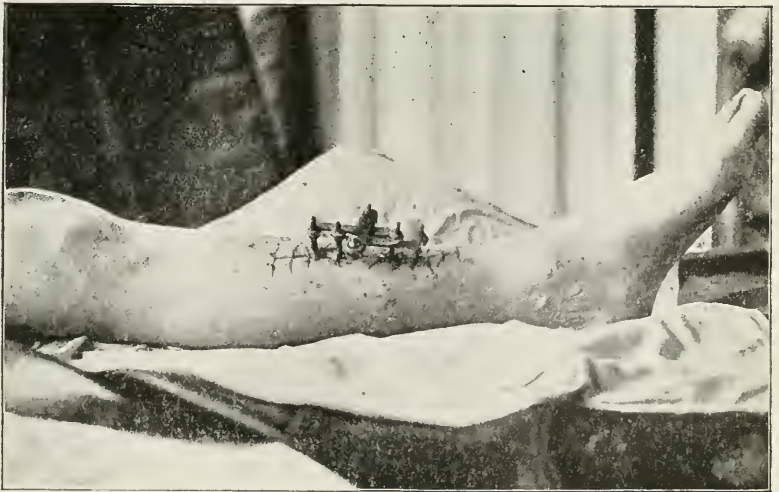


FIG. 4.—Appearance presented at first dressing, six weeks after application of clamp to a fracture of the tibia.

nently in place, either expecting them to become absorbed or ensheathed. In this category we would find the various forms of ligatures, such as catgut, kangaroo tendon, silk, and silver wire. The first objection that has been found to these is that they imperfectly fix the fragments, and dependence must be placed on external dressings. The second is that the non-absorbable materials not infrequently prove an irritant to the tissues, lowering their vitality, and leading to subsequent infection. This condition, in many cases, necessitates secondary operation for their removal, whether union be secured or not. In fact, save in exceptional cases, they act only as a stimulant to bone-production without either se-

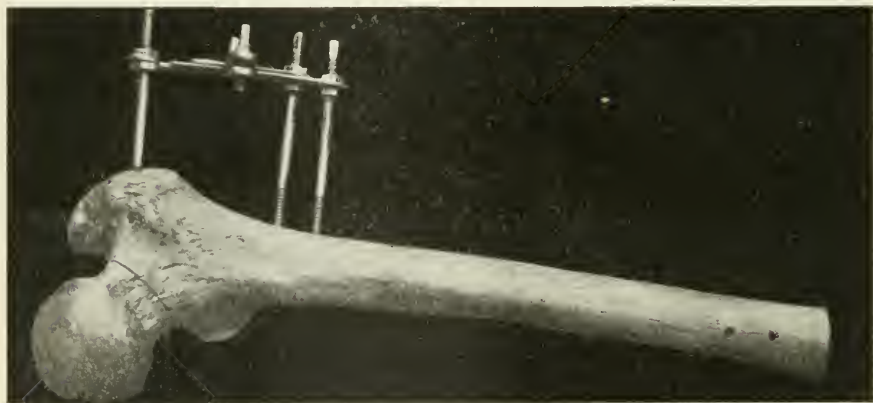


FIG. 5.—Clamp applied to a fracture of the neck of the femur

curing fixation or retention. In the same list should be placed bone-ferrules; ivory, bone, and metallic plugs, for insertion into the medullary cavities, and ivory and bone nails and pins. The objection to these is that their mechanical presence in many cases has led to infection, and necessitated secondary operative measures for their removal, while at the same time the fixation of the fragments was imperfect and insecure.

In the second class should be placed those instruments which tend more accurately to fix the fragments, such as metallic nails and screws, and the instrument of Keetley,

which are of sufficient size to project beyond the soft tissues. These, if used in connection with the "stepped" method of resection of Langenbeck, making what is known in mechanics as the "fish joint," are sufficient to fix the fragments. When this method of resection is used, however, it is at the expense of the length of the bone, and if any other form of resection be used, lateral motion is not prevented, except by means of external appliances.

In the third class we would place the buried metallic screw, the metallic double staple of Gussenbauer, and the plate and screws of Agnew. All of these are open to the objection of necessitating secondary operation for their removal, even if union does take place.

I desire again to call attention to a method for the fixation of the fragments in recent fractures with a tendency to displacement, in ununited fractures after resection, and in fractures with malunion after resection, which I had the honor to bring before the profession in a paper read before the American Surgical Association at its last meeting in Washington. I desire to add a number of cases to those embodied in that report, together with the additional experience gained in their treatment. The instrument shown in Figs. 1, 2, and 3 is adapted for use in all parts of the femur, except the neck. The intermediate size is smaller and is adapted for the tibia, humerus, and patella. The smallest size is for use in the bones of the forearm, fibula, and clavicle. The instrument is simple in construction, easy and accurate of adjustment, and when properly used secures absolute fixation of the fragments. Neither lateral nor longitudinal motion is possible. It is of steel, heavily plated with silver, in order to secure the antiseptic action of this metal. It consists essentially of four shafts, each with a thread cut on the lower end, and also one near the upper end. The extreme upper end, however, is made square so that the shaft may be governed by a clock-key. Two sets of curved wing plates are attached to these shafts, the longer pair corresponding to the outer ones and the shorter pair to the inner. Each wing plate is

fixed to its shaft by two nuts running upon the upper thread, one above the plate and the other below, for accuracy of adjustment. When in position one wing plate overlies the other in each half of the instrument, and when clamped, the pair lie side by side. They are fastened together by a steel clamp with a screw in each end. These screws and shafts are controlled by the same clock-key, and the nuts by a small wrench. The parts composing the apparatus are shown in Fig. 1.

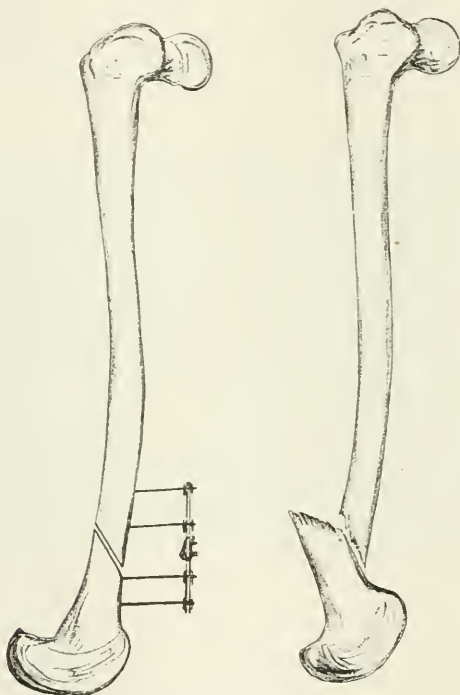


FIG. 6.—Pseudarthrosis of femur.

Any method of resection of the bony fragments which may be found desirable in the particular case may be used. The transverse is probably the most easy of execution and generally the most desirable. The periosteum may or may not be separated from the fragments. In the forearm and in the leg, if one bone is intact while its fellow demands operation, it should be shortened to a corresponding degree, and

clamped in a similar manner. Each fragment is drilled transversely to the longitudinal axis of the bone, and a small steel pin is thrust into the first hole, while the second is being drilled in order that they may be made parallel. The distance these holes should be from each other and from the ends of the fragments should be determined by the bone under operation, and the size of the clamp to be used. The

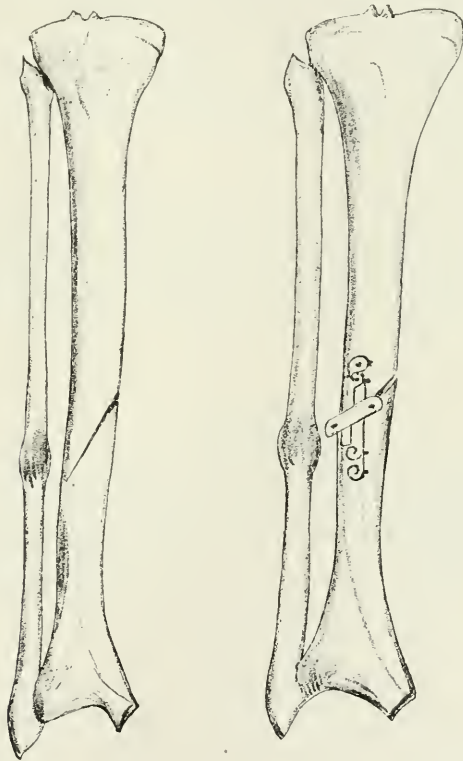


FIG. 7.—Fracture of leg with delayed union in tibia.

drill selected should be a trifle smaller than the shaft of the instrument, in order that the threads may take a firm hold on the bone. The shafts are screwed in place by means of the clock-key. This is more rapidly accomplished by means of the clock-key attachment fitted to a Langenbeck brace. The shafts being in place, their corresponding wing plates are

adjusted and fixed by means of their nuts. While the fragments are held in accurate apposition the wing plates are clamped together. The instrument is long enough to project through the incision in the soft tissues, in order to allow for the accurate suturing of the wound between the shafts and also for the interposition of a dressing. When possible the wound should be sutured without drainage. The part operated upon should be enclosed in a fixed dressing of plaster of Paris, or something of a similar nature. The instrument should be removed in from four to eight weeks (Fig. 4), depending upon the bone operated upon and the conditions of the particular case.

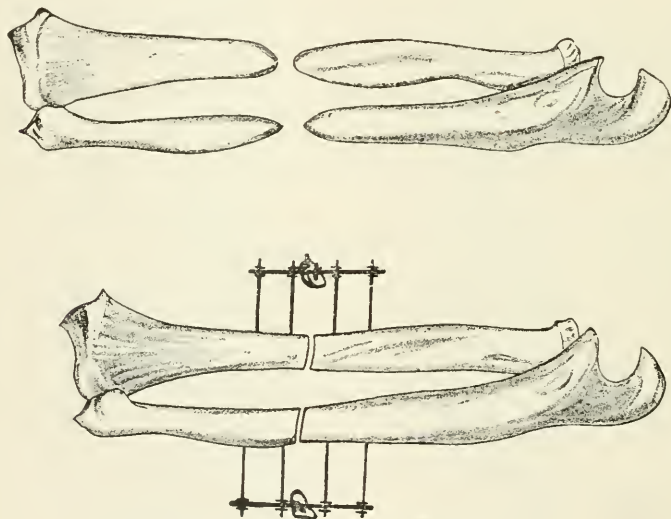


FIG. 8.—Pseudarthrosis of bones of forearm.

I made a special form of wing plate for patellar cases, but find it is unnecessary. By reversing one wing plate in each half of the instrument adapted for the humerus and clamping the plates longitudinally while the shafts are inserted in the form of a quadrangle every indication is met.

I have also a special form of clamp which I believe will be useful in fractures of the neck of the femur. (Fig. 5.) It has not been tried, however. It would seem to fix the head of the bone more accurately than any other instrument.

The following is a brief abstract of the histories of the cases upon which this instrument has been used.

CASE I.—(Operator, Parkhill.)—W. S., aged nineteen years, was sent from Walsenburg to St. Luke's Hospital, Denver, November 20, 1894. Pseudarthrosis of the right humerus as the result of a gunshot fracture eleven months previous. An open infected wound communicated with the upper fragment. On November 22 this wound was scraped out, removing all the infected tissue. It healed kindly, and on January 3, 1895, the clamp was used for uniting the fragments. The bones were found separated a distance of two inches. The upper fragment had a

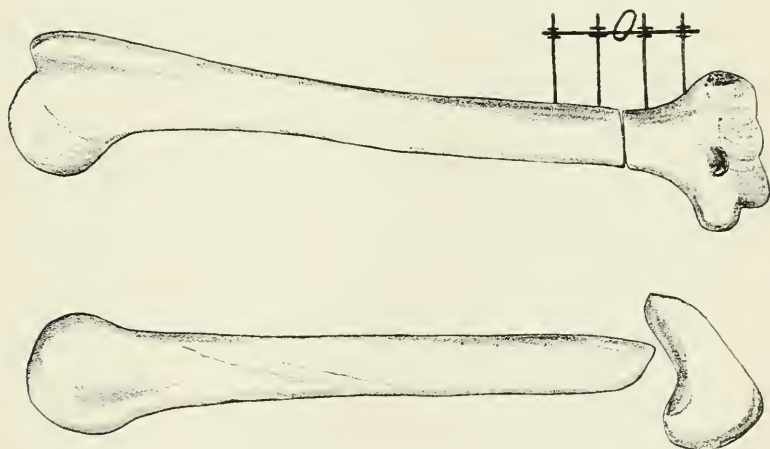


FIG. 9.—Pseudarthrosis of humerus.

length of one and a half inches, including the head, and was very soft. Transverse resection. The wound was closed about the clamp without drainage. The extremity, including the chest, was enclosed in a plaster-of-Paris dressing. No reaction. The dressing was removed February 7, 1895, when the wound was entirely healed. No infection. The clamp screws were lifted out without force. The sutures were removed. A dressing and cast applied. This was removed at the end of four weeks. Perfect union was observed.

CASE II.—(Operator, Parkhill.)—M. M., aged forty years, was sent from Victor, Col. Pseudarthrosis of nine months' standing, at the junction of the lower and middle thirds of the right

femur. There was great deformity with retrodisplacement of the lower fragment, customary in such fractures. Operated July 7, 1896. An anterior section of the soft tissues showed the lower end of the upper fragment resting upon the anterior surface of the lower. No attempt at osseous union. A large amount of fibrous tissue was removed with the scissors. The oblique ends of the fragments were freshened by means of the rongeur and Volkmann spoon. A large size femur clamp was applied.

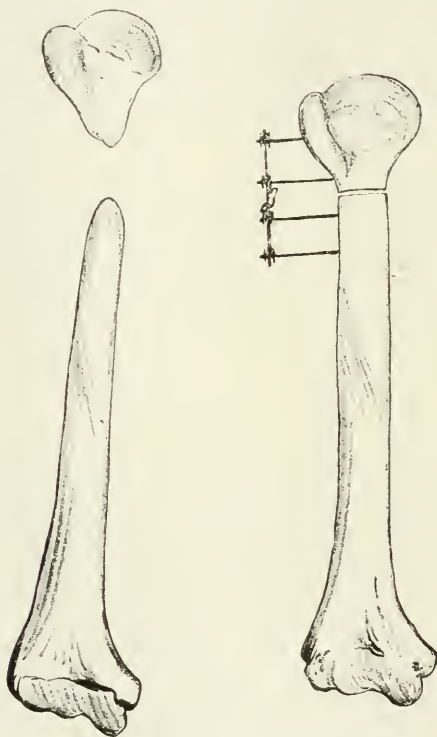


FIG. 10.—Pseudarthrosis of humerus.

Wound sutured about clamp without drainage. Sterilized dressing applied, and extremity enclosed in plaster of Paris. No reaction from operation. Dressing removed at the end of eight weeks. Perfect union of fragments. No infection of wound. Small dressing applied and plaster-of-Paris splint for three weeks longer. Present condition: Perfectly useful extremity.

CASE III.—(Operator, Parkhill. Delayed union.)—Dr. S. J., aged twenty-six years, on July 1, 1896, suffered oblique fracture

of both bones of the leg, at the junction of the lower and middle third, in a run-away accident. Temporary dressing in a fracture-box. Later, when the swelling had subsided, in plaster of Paris. At the end of six weeks some evidence of union, but far from perfect. Very impatient to secure union and get about his work. Operated August 15. Considerable amount of new osseous

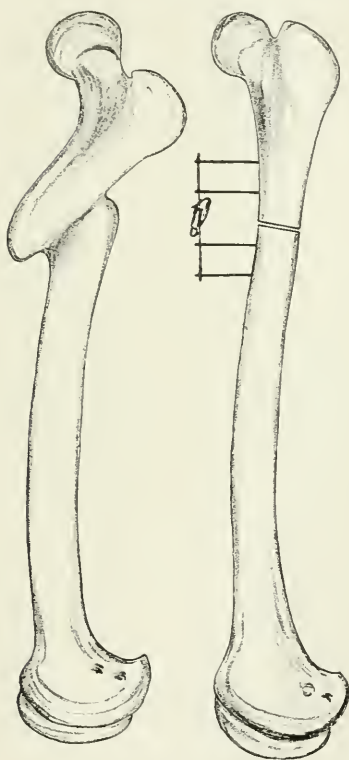


FIG. 11.—Malunion of femur.

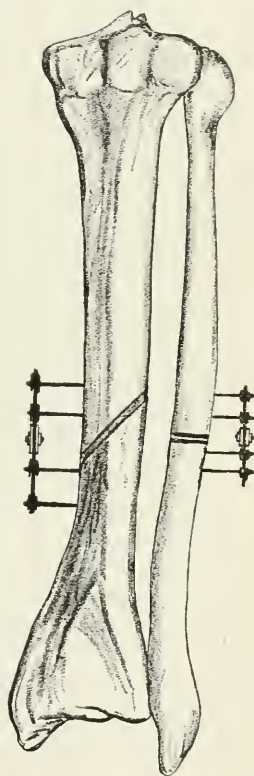


FIG. 12.—Nonunion of fracture of tibia; resection of fibula.

tissue filling the gap between the fragments. Also some fibrous tissue. Latter removed with a Volkmann spoon. Fragments drawn into accurate apposition and secured by a clamp. Wound sutured about clamp without drainage. Antiseptic dressing. Leg enclosed in plaster of Paris. No reaction. Clamp removed at the end of five weeks. No infection. Perfect union. Antiseptic dressing applied. Was given crutches. Perfect result at this time.

CASE IV.—(Operator, Parkhill.)—A. S., aged twenty-three years. Pseudarthrosis of both bones of the forearm as the result of a gunshot injury received in Utah, eight months previous. Sent to operator from Aspen, Col. Admitted to St. Luke's Hospital, August 12, 1896. Operated August 14. Fracture in the

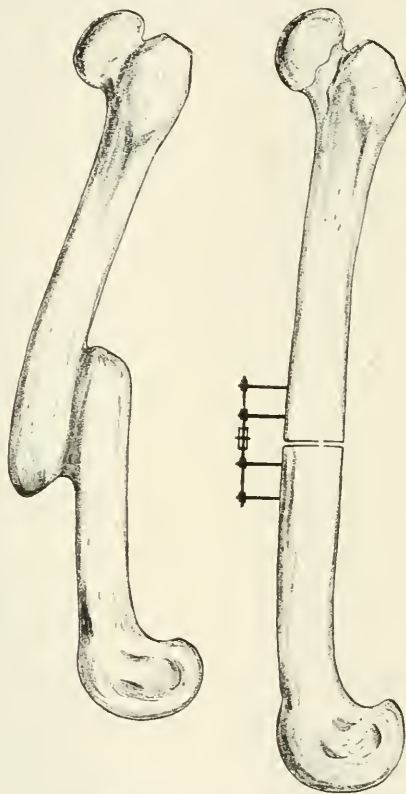


FIG. 13.—Malunion of fracture of femur.

middle of the forearm. Fragments separated about one inch. Large amount of fibrous tissue between the bones. Transverse resection of all the fragments so as to secure a symmetrical forearm. A small clamp used for each bone. Wound sutured about clamp without drainage. Antiseptic dressing applied. The forearm enclosed in plaster-of-Paris splint. No reaction. Dressing removed at the end of six weeks. Clamps taken out. No infection. Good union of both bones. Small antiseptic dressing applied. Forearm placed in anterior metallic splint. When seen,

two months later, had regained considerable amount of motion in the fingers, and the hand promised to be a very useful one.

CASE V.—(Operator, Mager. Recent fracture with a tendency to displacement.)—A. D., aged thirty-two years, a traveling salesman. Steady drinker for some years. On December 24, 1895, while driving in the mountains, the horses became frightened and ran away. He was thrown from the buggy. Right leg was caught in wheel, causing compound comminuted fracture of both bones in the middle third. Admitted to the hospital the same evening. Wound cleansed mechanically and antiseptically. Small fragments of bone removed. Resection of fragments of tibia. Union by silver wire. Aside from normal aseptic fever no reaction. At the end of a week, during sleep, a violent muscular contraction broke the wire and again fractured the lower end of the upper fragment. On January 5 the second operation was performed. Second resection of upper fragment. Parkhill clamp used. Antiseptic dressing. Plaster-of-Paris cast. At the end of seven weeks the dressings were removed. Union, but not strong. Antiseptic dressing reapplied. Perfect union at the end of ten weeks. Useful extremity.

CASE VI.—(Operator, McNaught. Pseudarthrosis of the right humerus.)—G. B., aged thirty-five years. Railroad accident. November 2, 1895, car-wheel passed over upper fourth of the right humerus, producing compound comminuted fracture. Great destruction of the soft tissues and bone. Lack of union after the wound had healed. Operated February 2, 1897, at St. Luke's Hospital. Transverse section. Parkhill clamp used. Wound closed about the clamp without drainage. Antiseptic dressing. Plaster-of-Paris cast. Clamp removed at the end of six weeks. Good union, with useful extremity.

CASE VII.—(Operator, McNaught. Pseudarthrosis of the left humerus one and a half inches from elbow-joint.)—H. H., aged sixty years. Operated May 21, 1896. Parkhill clamp used. At the end of six weeks the clamp was removed. Good union. Discharged from hospital. The night following discharge the patient, in a drunken spree, refractured the arm. The following November again presented himself for treatment, requesting that the same instrument be used. Clamp applied, and at the end of six weeks perfect union was obtained.

CASE VIII.—(Operator, Freeman. Pseudarthrosis of the left humerus.)—A. C., aged thirty-five years. Eighteen months

previous to operation received comminuted fracture of the left humerus at the junction of the upper and middle thirds. In May, 1896, admitted to Arapahoe County Hospital, Denver. Fibrous union and a small sinus. Operated by surgeon on duty.

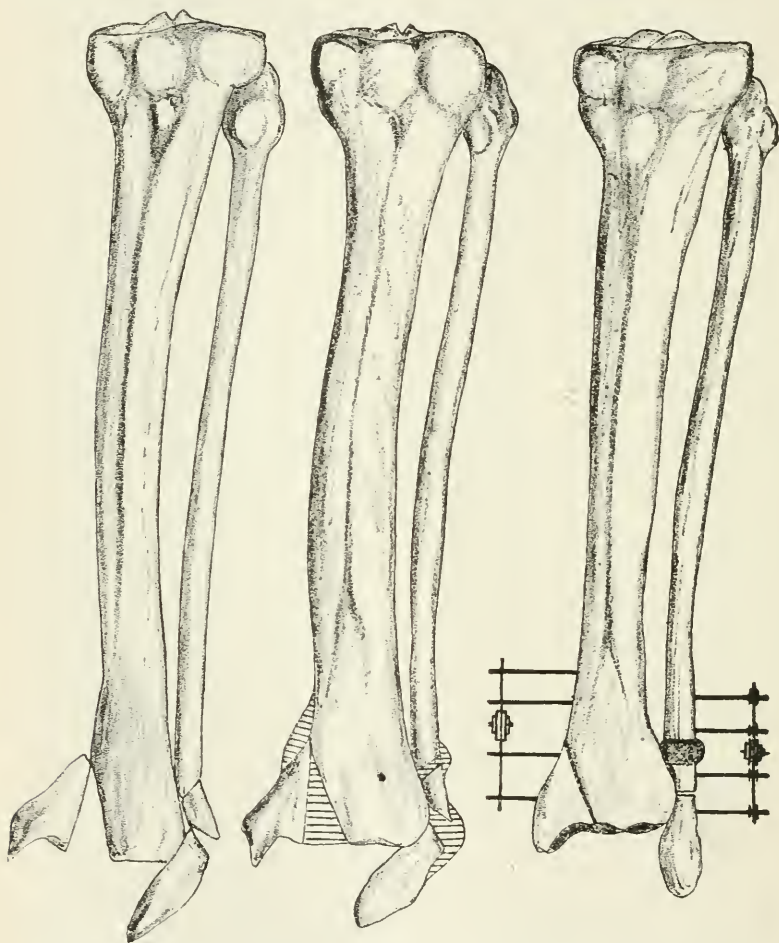


FIG. 14.—Fractures of bones of leg, involving ankle-joint, united in deformity.

Resection of ends and suture by silver wire. Failure. Operated September 30, 1896. Ends again resected and united by Parkhill clamp. Upper fragment of shaft not more than one-quarter of an inch in length. Practically nothing but head of bone remaining.

Clamp applied, size for femur instead of humerus, so that application was difficult. Much oozing from the wound. Impossible to entirely check it. This necessitated frequent changes of dressing for considerable length of time. Infection lasting about three weeks. Clamp removed November 3. Perfect union with motion at shoulder-joint. Patient could place hand to top of head. Useful extremity.

CASE IX.—(Operator, Parkhill.)—W. M., aged thirteen years. Malunion of the left femur of about ten months' standing, fracture having occurred at junction of upper with middle third. Upper fragment tilted upward and outward. Lower fragment united with it at an angle producing great deformity and much shortening. Operated February 5, 1897. Anterior incision. Fragments separated with difficulty by means of saw and chisel. Transverse section of ends. Extremity extended, and a gain in length secured amounting to an inch or an inch and a half. Clamp applied. Wound sutured about instrument without drainage. Antiseptic dressing and entire extremity and pelvis enclosed in plaster cast. Dressing removed at the end of seven weeks. Perfect union and perfect symmetry of bone. No infection. A light dressing with external and posterior light splint. Dressing taken off at end of nine weeks and splints removed. Was given crutches and is now walking on extremity.

CASE X.—(Operator, Parkhill. Pseudarthrosis.)—O. O., aged twenty-eight years, has led a dissipated life and been a more or less heavy drinker until two years ago, when he contracted syphilis. Since that time he has been a periodical drinker. He has had practically no treatment for syphilis. On the 30th of March, 1897, he sustained a fracture of the left tibia at the junction of the lower with the middle third, in a railroad accident in the State of Washington. Non-union. First operation June 18, 1897. Oblique fracture from above downward and forward. Space between the fractured ends filled with dense fibrous tissue. Fragments freshened with scissors and Volkmann spoon. Clamped. At the end of six weeks the instrument was removed. No union. Operated the second time on September 28, 1897. Resection of the tibial fragments with saw in the line of fracture; corresponding portion of the fibula removed. Clamp adjusted in each bone. Wound sutured without drainage. Extremity enclosed in a plaster cast. First dressing made and clamp removed

at the end of seven weeks. Perfect union of both bones. No infection.

CASE XI.—(Operator, Parkhill. Malunion.)—R. H., a healthy miner who had been a hard drinker. Left femur fractured in the middle third by the kick of a man posteriorly, on May 7, 1897, at Creede, Col. Treated in that city. Was in splint five

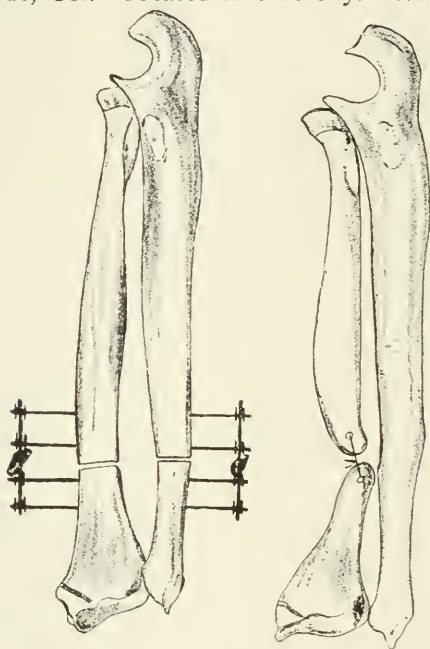


FIG. 15.—Pseudarthrosis of radius.

weeks. On presenting himself, in October, union was firm but with deformity, the upper fragment overlying the lower and overriding at least three inches. The thigh bowed anteriorly and externally, crippling him seriously. Operated October 29. Anterior incision. Fragments separated with great difficulty, by means of a chisel and mallet. Ends resected transversely. Strong extension made on extremity and a gain of at least two inches in length was secured. Clamped in place. Extremity including the pelvis enclosed in an external dressing of plaster of Paris. Wound was dressed at the end of a month. Light grade of infection found, probably due to imperfect preparation of the thigh for operation. Instrument removed at the end of forty days. Good union secured without deformity.

CASE XII.—(Operator, Parkhill. Malunion.)—Mrs. S., aged forty-six. Fracture of both bones of the left leg by a fall from a wagon, August 3, 1897. Treated at her home at Buffalo Park, Col. In splint three weeks. On presenting herself to operator, union was found with great deformity, the foot being inverted and resting upon its outer border. Operated November 6, 1897. Incision on the inner surface of the tibia discovered that there had been an oblique fracture from below upward and inward, splitting off the inner malleolus with a small portion of the adjoining articular surface of the tibia, the fracture line extending upward to a distance of about one and a half inches. The fracture united with great deformity. An incision over the fibular side of the ankle showed a multiple fracture of the lower end of the fibula. These fractures had united, but with the outer malleolus displaced strongly inward. Resection of each bone, and replacement of fragment in normal position. A clamp used for each bone. Three shafts of each clamp fixed in the upper fragment and one in the lower. Sutured without drainage. Extremity enclosed in external dressing of plaster of Paris. Clamp removed December 18, 1897. Good union with perfect symmetry. No infection.

CASE XIII.—(Operator, Parkhill. Pseudarthrosis.)—C. McC., aged fifty-eight. Fracture of right radius at junction of the lower with the middle third March 1, 1897. Treated in splints at Cripple Creek, Col. Non-union. Operated in Cripple Creek in June, 1897. Fragments wired with silver. Failed to unite. Presented himself to operator early in November with pseudarthrosis. Operated November 13. Incision over the outer margin of the radius. Fragments resected transversely. Incision over the inner margin of the ulna, and removal of three-fourths of an inch of bone, making a symmetrical forearm. Clamp used in each bone. Sutured without drainage. Extremity enclosed in external dressing of plaster of Paris, reaching above the elbow-joint and fixing the forearm at a right angle. Clamp removed December 28. Good union with perfect symmetry.

CASE XIV.—(Operator, McNaught. Recent fracture with displacement.)—W. W., aged thirty. Received a fracture of the patella while mounting a moving train, September 11, 1897. The fracture was probably due to muscular action, as he recollects no injury. The fracture was transverse. He was treated on an

Agnew splint, and apparently good union was obtained. Was discharged from the hospital on December 2, 1897. Slipped on the icy pavement the same day and refractured the patella. Returned to the hospital and was operated December 10. The fragments were found separated about one inch, the fractured surfaces freshened by the Volkmann spoon and cutting forceps. The Parkhill clamp applied, the shafts being inserted into the fragments in the form of a quadrangle. Perfect apposition. Wound closed without drainage. Progress until the present time uneventful. Good union obtained.

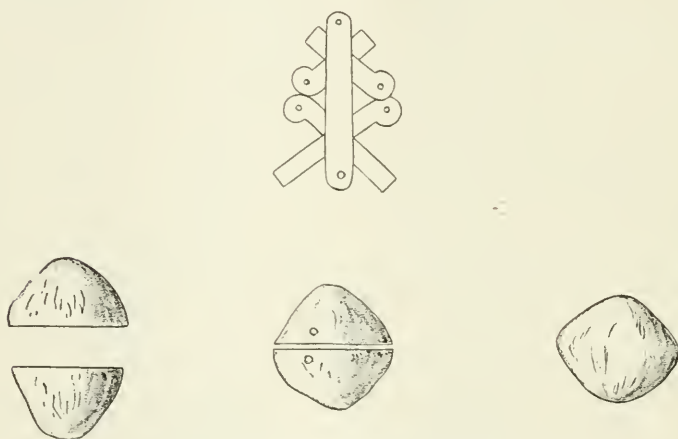


FIG. 16.—Recent fracture of patella.

We claim for this instrument:

(1) That union has been secured in every case in which it has been used, as against 56 per cent. of cures by all mechanical means, according to the statistics of Bruns and Gurlt.

(2) That it is easily and accurately adjusted.

(3) That it prevents both longitudinal and lateral motion between the fragments.

(4) That the presence of the shafts in the bone stimulates the production of osseous tissue.

(5) That nothing is left in the tissue that might reduce their vitality or lead to pain and infection.

(6) That no secondary operation is necessitated.

REMARKS ON THE TREATMENT OF STONE IN
THE BLADDER WHEN ASSOCIATED WITH
HYPERTROPHY OF THE PROSTATE.

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Six years ago (February, 1892), stone in the bladder being the subject under discussion before this society,¹ I had the honor, by your invitation, of joining in a debate, and to-day I am accorded a like privilege.

Then the centre of interest was the calculus, and in considering stone as the malady it became necessary to touch upon various complications, among others that of hypertrophy of the prostate. To-day, on the other hand, hypertrophied prostate is the malady, and I have been asked to deal with that portion of the subject which relates to its complication by stone.

Under the circumstances, it seems to be only logical and in natural sequence that out of the peroration of the former address I should construct an exordium for this one, especially since it is a fact that what was shadowed out as an impression in my mind at that time has in the intervening six years ripened into a conviction.

I then advocated litholapaxy whenever practicable; but—and this is the peroration to which I refer—I expressed my leaning towards a belief, even in the case of very small stone, when the prostatic condition is a main factor in the general morbid state, that it might be wise to insist on a cutting operation by the suprapubic route, prolonging the lithotomy into a prostatectomy, that thus the patient's necessity might

¹ The Medical Society of the State of New York.

be converted into the surgeon's opportunity. It is mainly in affirming this proposition that I shall consume the brief time allotted to me to-day.

When the surgeon is called upon to select a line of action in contemplating the double condition, hypertrophied prostate plus stone, he may well say to himself, I do here perceive a divided duty; because, as a malady, stone in the bladder cannot be considered a single morbid entity. The stone plays a double rôle. While it undoubtedly aggravates the subjective symptoms for which the patient seeks relief, it is not of itself the cause of all these symptoms when the prostate is also pathologically modified. Indeed, when the stone is phosphatic it is nothing more than an objective symptom of the catarrhal process in the bladder due to the prostatic malady; and although the stone may and does mechanically intensify the subjective symptoms, pain and vesical irritability, and while its removal is imperative if a cure be aimed at, it is no more logical to expect a cure of the complex malady by removing one of its objective symptoms—the calculus—by crushing or cutting, than by removing one of its subjective symptoms—pain—by opium.

It is unnecessary here to more than mention the distinction between primary acid stone, forming in a bladder otherwise normal, and mechanically, after a time, lighting up catarrhal symptoms; and secondary phosphatic stone, itself a direct result of a catarrhal state of the vesical mucous membrane plus obstruction to urinary outflow. This distinction is to-day thoroughly understood and accepted.

But the question at once presents itself: granting that a phosphatic stone may be considered a symptom of other conditions and assigned a second place in deciding upon such remedial means as shall address themselves to the entire morbid state, yet what shall be our course when, although the prostate be enlarged, the stone is primary, uric acid or oxalate, and notably when the stone is quite small? Is the surgeon justified under such circumstances in subjecting his patient to a grave operation, lithotomy with or without pros-

tatectomy, when the much less serious alternative, litholapaxy, might more safely encompass the necessity, in so far as the calculus is concerned?

Now it must be granted that if the stone could be eliminated by some act of magic, the case would resolve itself into one of ordinary prostatic enlargement, to be treated upon its own merits, and therefore the question I have proposed may be answered by another,—namely, can the stone be entirely removed without serious irritation due to the process of removal? and, secondly, if the stone can be so removed, will the result be generally satisfactory to the patient?

And this is the nucleus of the whole matter that I am called upon to consider.

I was already an active worker in the genito-urinary field when Bigelow, in 1878 (*American Journal of the Medical Sciences*, January, 1878), introduced litholapaxy to the world. I adopted the operation, added my public testimony to its value, became its earnest advocate, have performed it often, and now in my series of second hundred cases still endorse it boldly.

But a broadening experience has been and still is teaching me to curtail the field of its usefulness, and I no longer think that it is so generally applicable as I at one time believed it to be.

For this as for any other operation a certain judgment is necessary, not only in the selection of the case, but in the selection of the operator. For litholapaxy is clearly an operation in which special dexterity due to frequent performance counts for more than anything else. A general surgeon will perform a cystotomy, a lithotomy, a prostatectomy as well as any other cutting operation. These acts are included in the field of general surgery. But this same general surgeon, however great his skill and his delicacy of touch, will not perform litholapaxy as well the fifth time he does it as the fiftieth time, whereas there will be no difference between his fifth and his fiftieth lithotomy, either in its performance or its result.

This fact I emphasized as long ago as 1880 ("Rapid Lithotripsy with Evacuation," *American Journal of the Medical Sciences*, April, 1880), showing at that date the mortality of litholapaxy at the hands of operators who had reported five cases or less to be over 9 per cent., while for those who had operated on more than five cases the mortality was less than 3 per cent. The brilliant reports of litholapaxy in skilled hands of late years, both as applied to children and adults, all the world over, in India, Egypt, France, England, and America, go to show that litholapaxy in expert hands is only a little more serious an operation than passing a catheter.

Yet just here the questions upon which I have been harping again arise. Can ever an experienced lithotritist remove the last fragments of the calculus in every case when the prostate is large? secondly, if he could so remove it, would the patient be satisfactorily well? and I think I may answer both of these questions by an unqualified negative.

Neither the limits of my time nor your patience allow me to build up a justification of this answer by the citation of individual cases in detail, because I must use the time to crystallize what I have to say into the form of a practical suggestion. Suffice it to confess, I have in several instances, relying upon my confidence in litholapaxy, committed the error of attempting to remove a small stone complicating enlarged prostate in cases unsuited for that operation, with the result, whether the fragments were entirely removed or not, of aggravating the patient's condition, making lithotomy ultimately necessary, either at my own hands or, to my mortification, at those of another surgeon,—not for the small fragments of stone that were left, but for the persistent aggravation of the subjective and catarrhal symptoms occasioned by the manœuvres of the lithotrite and tube, symptoms which ordinary surgical means proved unable to overcome on account of existing prostatic disease.

And I have equally a number of other cases illustrating that an entire removal of the stone without bruising the vesical neck—that is, the removal of the stone by suprapubic

lithotomy—has not placed the patient in a satisfactory condition, although, of course, the improvement has been very considerable after the mechanical irritation caused by the stone has been taken away, and life, before intolerable, has become bearable.

My most notable case exemplifying this postulate is that of a gentleman of sixty-two years, worn out by suffering, from whom I removed eight years ago three phosphatic stones weighing an ounce and six drachms. One of the stones was encysted in the orifice of the ureter, and the consequent reflex irritation upon the kidney may be imagined.

This patient is well enough to-day. He attends to his duties and is on the whole satisfied. He has to rely upon his catheter to void his urine,—in itself not so grievous a result,—but he has had a number of returns of opening of the wound above the pubes which have annoyed him and required considerable treatment for their closure,—openings which doubtless would not have occurred had the prostate been attended to when the door was opened through the bladder wall for the removal of the stones.

I have another very striking case in point of a gentleman from the West, a German, who was unwilling to trust an American surgeon to treat his bladder symptoms, and went to his native land, where one of the most prominent surgeons of the day cut him above the pubes and took out a phosphatic stone. This patient was by no means cured. When the wound closed his symptoms returned. He visited me on two occasions from the West for a reopening of his fistula. I succeeded in closing it on both occasions, but had great difficulty in sweetening his bladder and getting him into catheter life,—which he objected to,—a difficulty which would not have existed had his prostatic bar and third lobe been disposed of by the surgeon who cut him for stone. The necessity for catheter life might have remained, but I believe the wound would not have reopened, and that catheter-life could have been more promptly and easily instituted had the granu-

lar sensitive lobe and bar been removed as well as the stone.

I ask you to listen to only one more case and then I shall have illustrated the points upon which I propose to summarize.

Six and a half years ago I operated upon a gentleman in the sixties, a dreadful sufferer for many years, whom I found bedridden, passing urine resembling gruel, tortured by incessant pain, night and day, seminarcotized by opium. I cut him above the pubes, removed a phosphatic stone weighing 590 grammes, and with a wire *écraseur*, going as close to the neck of the bladder as I could, I removed a third lobe, about an inch long and as large round as the little finger,—the cause of all the trouble.

My patient struggled through a desperate suppression and recovered, gaining in a few months seventy pounds in weight, giving up his opium, holding his urine seven hours, voiding it spontaneously, and exulting in his cure; yet, although in this case an enormous third lobe had been removed, a slight bar remained, and a little residual urine, which the patient neglected, and in one year after his first operation he came back with another stone, also phosphatic, and a modified reproduction of all his former symptoms.

My first operation had been practically one of emergency, and my hope for its success not great. I had had scruples about doing anything more than to take the stone away and put the bladder muscle at rest by drainage, but this long, finger-like lobe was too tempting for my surgical virtue to resist, and I snared it off, thus increasing the grade of operative severity and the patient's risk; but I did not still further increase it, as I should have done, to have made the operation technically perfect, by gouging out the bar and lowering the urethral floor at its beginning.

The result was natural. My patient, finding that he could urinate at will in a large stream without straining and that he had no bladder symptoms, neglected to follow my injunction and disregarded the small amount of residual urine

that yet remained. He did not wash his bladder, and his stone returned. For this I cut him in the perineum, removing three drachms of phosphatic stone, and this time I cut down the prostatic bar well to the floor of the *bas-fond* and forced it to heal open by maintaining a large tube in place for a considerable time. This was five and a half years ago, and my patient writes me a few weeks since that he is perfectly well as to his bladder, which empties itself voluntarily down to the last drop. His intervals are normal and his stream ample. Frightened by his former experience he still washes his bladder occasionally, but, since there is no residual urine, it is doubtful whether this precaution is necessary.

A contrast between the result of these two operations upon the same individual illustrates the point I am endeavoring to make. In this case removing the stone, while it relieved, did not cure nor did partial prostatectomy (ablation of the third lobe) cure, but when the obstruction was removed, the bar cut down, the urethra lowered, and the bladder rendered capable of emptying itself entirely—although the rest of the prostate was still larger than normal—a cure was accomplished.

Cases, on the other side of the picture, are too numerous to justify citation. Any lithotritist of large experience can adduce a score, since they are of the most common occurrence,—I mean cases in which the prostate being large, sometimes very large,—the bladder being considerably atonied, or not, as the case may be, the conditions are such that the prostatic sinus will tolerate instrumentation without serious revolt, the bar is absent or small, and the *bas-fond* not so deep as to make it mechanically impossible for the shorter male blade of the inverted lithotrite to pick up the final flat fragments of stone from the floor of the bladder.

These cases do perfectly well under litholapaxy. The stone can be removed without risk or damage, and the patient is left with his enlarged prostate uncomplicated, for the catheter and more or less vesical irrigation to attend to,—and all this is attained without the risk of a severe operation, which prostatectomy is.

So grave is it and so far from being ideal in the functional results that it guarantees, that we hear less about prostatectomy now than formerly, and wide-spread efforts are being generally made to substitute milder operative procedures, orchidectomy, vasectomy, and the Bassini operation for cutting down the prostatic bar by electricity from within.

Prostatectomy is not now generally advocated by the Guyon school in France. The tendency there is to return to the catheter with asepsis. A serious opposition is steadily growing up against orchidectomy,—which has been much overdone, and is not, in my opinion, as devoid of risk to the patient's body and danger to his mind as has been claimed.

Vasectomy I believe to be of little value in reducing the size of the prostate. Prostatectomy I consider the operation of choice in prostatic cases, when the patient cannot get along with the catheter and asepsis.

But there are two kinds of prostatectomy, one the total evisceration of the capsule of the gland from above or from below; and the other partial prostatectomy, cutting away third lobes, bars, horse-collar overgrowths, and enucleating interstitial prostatic tumors.

The last-named group of operations gives the best result, if the floor of the urethra be lowered by gouging out the vesical prostatic orifice upon the floor with an emporte-piece, or cutting it well down and forcing it to heal open by the prolonged wearing during the granulating process of a large perineal tube.

Total evisceration of the prostatic capsule does not always cure. I have seen functional disturbance persist after it and partial incontinence, while its risk is greater than that of partial prostatectomy, because it is a more violent and more extensive operation.

Moreover, as we all know, it is not the size of the prostate that makes it obstructive or causes it to yield subjective symptoms. Many a man with a very large prostate empties his bladder entirely, has no residual urine, and does not greatly complain, while another with practically no general

enlargement but with a third lobe or a prominent bar—thus making his prostate actively obstructing—will suffer the torments of the damned, and embrace any operation and take any risk which promises to relieve him from his torture. It should therefore be the surgeon's object to remove the obstructing portion of the prostate rather than to take the organ away in bulk, since the bulk alone, generally, does little damage.

Here, then, are just the conditions that we sometimes find typically illustrated in a case of prostatic enlargement complicated by stone,—namely, a prostate slightly or greatly enlarged, a tender prostatic urethra, which if traumatically irritated by the lithotrite and tube in efforts to remove a stone will resent the injury, and a residual accumulation of urine which cannot be properly attended to on account of this very prostatic obstruction and irritability, making the kindly use of the catheter impossible.

In such a contingency it is clearly the surgeon's duty to cut, and if he cuts he has the door open; and with the patient's consent it is only fair to add somewhat to the operative risk by prolonging the lithotomy into a partial prostatectomy for the ultimate good that will come of it.

The facts that I have stated I can vouch for, and if the postulates I have constructed out of them are accurate and my logic sound, the deductions become obvious and may be summed up as follows:

CONCLUSIONS.

(1) When stone complicates enlarged prostate, if the condition of the latter be such that were the stone absent no operation would be called for, then the whole question is to be solved by deciding whether the obstructive quality of the prostatic enlargement, the size of the bar, the depth of the bas-fond, the irritability of the prostatic urethra, and its resentment of instrumental interference,—whether any of these factors be sufficiently accentuated to make litholapaxy impossible or to make it possible only at the expense of leaving

the patient (as to his subjective symptoms) worse than before.

If such conditions do obtain, then the stone should be removed by the knife.

(2) In short, the main matter is one of diagnosis by the searcher, the cystoscope, rectal touch, and the tentative testing of the prostatic urethra with instruments.

(3) The mere size of the prostate is not a factor in the problem.

(4) The size or position of the stone is not a factor, except in the case of encysted stone, or one too large for the lithotrite to grasp, or in the case of a foreign body. The smallness alone of the stone is relatively an argument against litholapaxy, since the symptoms in such a condition must be ascribed rather to the prostate than to the foreign body.

(5) If lithotomy be performed, the suprapubic route should be elected, since this opens the door for more perfect work and allows the surgeon to remove obstructions, such as third lobe, interstitial growths, outstanding horse-collar enlargement, bar, and to lower the vesical end of the urethral floor, thus accomplishing all that could be done by a more extensive prostatectomy without very seriously increasing the operative risk.

(6) Finally, here, as elsewhere in surgery, the only safe practical guide is surgical judgment, based upon diagnosis, guided by experience.

OPERATION WITHOUT ETHER OR CHLOROFORM NARCOSIS. GENERAL OBSERVATIONS AND REPORT OF ILLUSTRATIVE CASES.¹

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IN operating upon the aged and the feeble, or upon individuals suffering from heart-, lung-, or kidney-disease, it is no exaggeration to say that the surgeon's chief cause for anxiety is not so much the operative work itself as the anæsthetic and its administration.

It is also true that many surgeons shrink from employing local anæsthetics, because of a feeling that they are not always to be depended upon, and because cocaine, the one until a year ago most used, occasionally gave rise to disagreeable and sometimes toxic symptoms.

Nitrous oxide, to be sure, is an ideal anæsthetic, so far as the patient is concerned, for it is pleasant to take and its after-effects are evanescent; but for the surgeon it has disadvantages. The apparatus is quite complicated, it is not easily portable, and the administration of the gas must be specially learned. The cyanosis, too, which accompanies the narcosis is confusing to one who is not accustomed to the sight. Still, nitrous oxide is very useful and is employed too seldom.

Ethyl chloride and the other freezing substances should only be resorted to when a mere incision is to be made; beyond this they are, in my opinion, unpractical as surgical

¹ Read before the New York Surgical Society, February 9, 1898.

anæsthetics. They harden the tissues so that the knife enters with difficulty and blanch them so that the appearance of the cut surface is deceptive. Infiltration anæsthesia, as by the Schleich cocaine mixtures, possesses the disadvantage of changing the local appearances by reason of the œdema-like look from the presence of so much fluid.

During the past three years I have noted the effects of cocaine, eucaïne, and nitrous oxide in the performance of operations, which are rarely done without ether or chloroform narcosis, and I shall here present a few personal observations and conclusions, together with brief notes of the more illustrative cases.

In determining to use local anæsthesia one must take into account two factors,—viz., the nature of the operation and the temperament of the patient. Most operations upon soft parts not requiring very extensive incision, and not involving the prolonged manipulation of sensitive nerves, are suitable for this form of anæsthesia where there is no acute inflammatory process present in the skin or subcutaneous tissue. When such inflammatory processes are present little more than simple incision should be attempted with local anæsthesia. As to the temperament of the patient, I believe that most persons who are not hypersensitive or neurasthenic will bear well enough surgical work of this kind.

Nitrous oxide gas has not, of course, the limitations just referred to, but in my experience quiet and leisurely dissection with gas narcosis is hardly possible. I therefore select the gas as the narcotic in those cases where I know pretty nearly the exact time of each step of the operation and where no careful dissection has to be made.

Following is a list of some of the more important operations done by me within the last three years with cocaine, nitrous oxide, or eucaïne.

With Cocaine Anæsthesia.—Deep cervical abscess causing œdema of the glottis. Incision and evacuation. Double castration for enlarged prostate, two cases; prethyroid cyst, two cases; laparotomy and drainage of abscess about the ap-

pendix; nephrotomy for suppression (septic); colotomy for obstruction, empyema of thorax; incision of large, deep, pyæmic lumbar abscess; incision of large, deep pyæmic iliac abscess.

Incision and drainage of a perinephritic abscess.

With Nitrous Oxide Gas Anæsthesia.—Arthrotomy for loose body in knee-joint. Incision of a deep abscess about the appendix; amputation of the thigh for senile gangrene; secondary suprapubic cystotomy for stone.

With Eucaïne Anæsthesia.—Bassini's operation for inguinal hernia, not strangulated, two cases; strangulated hernia with Bassini's radical operation, one case; secondary suprapubic cystotomy with partial prostatectomy; right colotomy for chronic obstruction; cholecystotomy for empyema of the gall-bladder, three cases; excision of an adenoma of the breast, the tumor being as large as a duck's egg.

Besides the operations mentioned in this list, numerous less important ones were done which will not be mentioned here, though the experience thus gained has helped to formulate my conclusions.

The best local anæsthetic with which I am acquainted is eucaïne. Compared with cocaine, solutions of greater strength are required, but as eucaïne, in the human subject at least, is far less poisonous than cocaine, stronger solutions may be safely employed. I have generally used from 6-per-cent. to 10-per-cent. solutions, and thus far, in over fifty cases, I have noted not a single instance where there were toxic symptoms. I have injected as much as nine grains of the hydrochlorate at one sitting, though I believe that five grains will usually be sufficient for an operation of considerable magnitude, as, for example, herniotomy, and this quantity can probably be still further reduced. The benumbing power of eucaïne is quite as certain as that of cocaine, and I can truthfully say that I have never seen the prostration with cardiac failure so well known where cocaine in much smaller doses has been used. The anæsthetic effect, too, is more

persistent. Eucaine, however, does not benumb the mucous membranes on mere contact so effectively as does cocaine; when about to operate in the neighborhood of tissues covered by mucous membrane, I usually apply a little cocaine solution first and then inject the eucaine so that the needle prick may not be felt. As with any endermic injection there is momentary pain as the fluid enters.

If the operation is to be a severe one, or if it is expected to be prolonged, it is well to give the patient a small dose of morphine a quarter of an hour beforehand, more for the effect of the drug upon the mind than as an analgesic.

The best subjects for local anæsthesia are the very ignorant, where the fact that you are operating can often be hidden under the guise of an "examination," and next to these the more phlegmatic individuals of the enlightened class.

It is customary with me to promise that general narcosis will be employed, should the patient find that he is unable to bear the pain without it, but in no case has it been necessary because of pain to fulfil this promise, although in some instances I have, for other reasons, supplemented eucaine with chloroform.

It is not wise to promise that a patient shall have no pain; rather ask him whether he is not willing to suffer a little, and you will generally find that when the operation is over he will have been agreeably disappointed.

When working in an area known to be anæsthetized, it is not best to pay too much attention to the patient's expressions of pain. Usually the ones who complain most bitterly may be quieted by the assurance that the operation is almost over and by the offer of general narcosis. This offer, in my experience, has never been accepted. It is also a good plan to have a tactful assistant stand at the patient's head to comfort him and to distract his attention. Moral anæsthesia one might call it. It should also be the duty of this assistant to attend to the patient's wants, to keep watch of the pulse, and to note his general condition. In by far the majority of instances, if the patient is questioned immediately after the

operation, he will admit that he has not suffered, and that his demonstrations were due more to the expectation of pain than to the pain itself.

It should be remembered that the tissues beneath the skin are not benumbed, but retain their normal degree of sensation, unless separate applications or injections are made to deaden them, as in the case of the infiltration anæsthesia of Schleich. This injection into the deeper parts is of use only in certain operations. As to the sensitiveness of the various tissues, I have made a few observations.

The skin, of course, is perfectly anæsthetized as far as the drug has permeated.

Section or rough manipulation of muscle causes dull pain of an aching character, which is not hard to bear.

Section or manipulation of tendon is not felt.

Manipulation of nerve causes pain, which becomes acute if the nerve is grasped with a clamp or caught in a ligature. Section of nerve gives evanescent pain.

The ligation of arteries is painful, due, probably, to the fact that vasomotor nerves are sensitive. (Wyeth's explanation.)

Section, puncture, or gentle manipulation of parietal peritoneum is painless, whether this tissue is inflamed or not; but rough or extensive manipulation causes pain more or less severe.

The handling of intestine distended by gas causes colicky pain, sometimes of great severity; but undistended gut, whether inflamed or not, may be cut, burned, sutured, or handled without pain.

Separating intra-abdominal adhesions is painful in direct proportion to the firmness of the adhesions.

The ligating of omentum, when this tissue is massive and contains large vessels, is accompanied by a kind of "stomachache" with the tightening of each ligature.

Manipulation of the distended gall-bladder is painful, but puncture, suture, or even section of the distended viscus, whether inflamed or not, seems to be devoid of pain, as is

also handling, puncture, or section of the organ when it is flaccid. Tearing the walls of the gall-bladder causes pain.

Work on uninflamed bone is bearable, especially when a rubber constrictor has been applied; but no work can be done on inflamed bone, for it is exceedingly sensitive.

In some operations the absence of the unconsciousness accompanying general narcosis makes the work much easier. For example, in herniotomy, where the rupture is small and easily reducible, the external tumor may have disappeared. The patient under local anæsthesia can bring down the hernia by coughing or by voluntary straining, while with general narcosis the surgeon may be obliged to wait for vomiting or some other reflex strain before he can proceed. In tendon suture, too, when one wishes to assure himself that the ends have been correctly adjusted, voluntary motion supplies at once the physiological test.

NOTES AND REMARKS ON SOME OF THE WRITER'S CASES.¹

CASES I and II.—Double castration was done painlessly in two cases, one of the men even telling jokes during the operation. Eucaine was the anæsthetic employed. In this operation and also in the excision of varicocele it is well to inject a few minims of the solution into the fasciæ investing the cord after exposing this structure through a scrotal incision. A single mass ligature is tied round all the vessels which it is desired to occlude, and this ligature is tightened with one quick jerk. The vessels may be later secured separately. One thus avoids the infliction of pain with the ligation of each individual artery. The proximal ligature is the first one to be tightened.

It is my opinion that in nearly all cases for castration the operation is best performed with the aid of local anæsthesia.

The radical cure of inguinal hernia by the method of Bassini was practised in three instances. In one case the hernia was strangulated and in the other two it was reducible.

¹ The writer is indebted to Dr. J. B. Morrison, late House Surgeon at Mt. Sinai Hospital, for most of these notes and for skilful assistance with many operations.

CASE III.—H. F., a man forty years old, had a strangulated right inguinal rupture irreducible for over twenty-four hours. The usual symptoms were present with vomiting and beginning collapse, the pulse being notably weak. The man received one-fifth grain of morphine hypodermically, and I promised to employ general narcosis if he should demand it during the operation. Nearly a hundred minims of a 6-per-cent. eucaine solution were injected into the skin in the line of the proposed incision and the operation was performed as usual. The sac was found to contain a coil of very dark but not gangrenous small intestine and a large bunch of omentum. The gut was put back and the omentum, a large, fleshy piece, about nine inches long, was cut off beyond numerous ligatures. The time consumed, thus far, was about half an hour, as there had been considerable difficulty in clearing the cord from the sac, and the patient now began to grow restless and to complain of pain. He was told that the life-saving part of the work was over and that the operation could be stopped whenever he gave the word, but that his hernia could be radically cured if he wished to endure a little longer. He thereupon became quiet, and did not again seriously complain to the end of the operation, at least fifteen minutes later. He then assured me that the pain had not been at any time severe. Indeed, he was so enthusiastic that he at first said he had had no pain at all. This patient expressed great relief when the constricting neck of the hernia was cut through. He had "stomachache" each time a ligature was tightened about the omentum. The symptoms of collapse disappeared during the operation and the pulse steadily improved, the man's condition at the end of the three-quarters of an hour being better than it was at the beginning. Recovery was prompt and satisfactory. The operation was done at Mt. Sinai Hospital May 20, 1897.

CASE IV.—Mr. M., sixty years old, was operated upon at Mt. Sinai Hospital January 24, 1897. He had a right inguinal, irreducible, omental hernia as large as a goose-egg. The patient also had a chronic valvular heart lesion with pronounced asthma and a general atheromatous condition of the arteries. He was, on the whole, a most unpromising individual from a surgical point of view. This man also received a preliminary dose of morphine and a "drink" of whiskey. With the aid of eucaine, about nine grains in all, he stood the operation excellently, sub-

mitting to a troublesome dissection and to the ablation of a large piece of omentum. Perfect recovery with no complication followed.

CASE V.—J. M., a man of twenty-one, had a small omental hernia which he found it impossible to retain by means of a truss. On the opposite side, the left, there was a chronic hydrocele of considerable size. June 23 I did Bassini's operation on the right side, cutting off a piece of thin omentum the size of a man's hand, and at the same sitting did a Volkmann's operation for hydrocele of the left side. The young man was a very neurotic individual, and he complained much all the way through the operation. There was in this case no sensation on ligating the attenuated omentum. Though the operation was of considerably less magnitude than either of the others, there was a decided reaction afterwards, almost as if the patient had taken general anæsthesia. There was vomiting for nearly two days with slight jaundice. The herniotomy wound did very well and the scrotal wound granulated as usual. It does not seem probable that these symptoms were in any way due to the eucaïne, while it is more than likely that they may be accounted for by the mere fact of a surgical operation in a neurotic person.

Two colotomies were done with the aid of local anæsthesia; one with cocaine and one with eucaïne.

CASE VI.—The one where cocaine was employed was that of a child dying of tubercular peritonitis, as was demonstrated at the autopsy. The little girl came into the hospital with a history of intestinal obstruction of a few days' standing and in a most wretched condition. Colotomy for relief was done in the median line, the little one dying the next day. There was no sign of pain during the operation, but this may be partly accounted for by her collapse, which was temporarily relieved by the colotomy.

CASE VII.—The other patient was a woman, sixty-nine years of age, who was in a very low vital condition from intestinal obstruction due to a malignant growth of the descending colon. Colotomy on the right side into the ascending colon was done with eucaïne. The patient was told that she was to be examined, and she did not know that an operation was being done. The gut was painlessly sewn into the abdominal wound, the opening

into its lumen being made the following day. There was hardly any pain and no reaction whatever. In spite of the age of the patient and her miserable condition, she recovered to die of her disease in about two months.

Eucaïne was used in three cases of cholecystotomy for empyema of the gall-bladder. In two of the cases the cause of the trouble was gall-stones, and in the third it was due to a malignant growth.

CASE VIII.—Mrs. R. B., thirty-five years old, was operated upon July 30, 1897. She had the usual symptoms of gall-bladder obstruction without icterus. The patient was thin, and the outline of the distended viscus was plainly visible without anæsthesia through the abdominal walls. Cholecystotomy, in two sittings, was done, eucaïne being employed for the first step, and no anæsthetic for the second. The only pain was caused by the drawing up of the distended gall-bladder into the wound. Twenty-four good-sized stones were removed and recovery followed.

CASE IX.—The other cholecystotomy for gall-stones was done last December. The patient was a very stout woman, and I feared that the local anæsthesia might not suffice, but she stood the trial well. Once, when a nerve accompanying a vessel was caught in the forceps, she cried out and asked for chloroform, but on my freeing the nerve she became quiet. She again complained when adherent omentum had to be separated from the gall-bladder, but the adhesions were tender and the suffering caused by their separation did not seem to be great. There was no reaction, and the usual relief from the emptying of the distended viscus was noted.

CASE X, the third cholecystotomy, is of interest because of the fatal result. The patient was a gentleman in feeble health, aged sixty-five years. Relief was demanded for an attack of sepsis, apparently due to empyema of the gall-bladder with great distention and pain. The operation was done on August 14, 1897, under eucaïne, with a preliminary hypodermic of morphine, and there was little if any pain. The second step of the operation had to be done within twenty-four hours, because of the progressing sepsis, and the gall-bladder was found to be filled with bloody fluid containing mucus and pus, besides a few concretions.

Nephritis, shown before the operation by the presence in the urine of albumen and casts, now caused almost total suppression, this evil symptom being later relieved by digitalis and calomel. The sepsis was not affected, however, and the man died of heart failure five days after the operation. I feel quite sure that the eucaïne had nothing to do with the fatal result, and, indeed, that the end might even have been hastened had ether or chloroform been given, for the patient suffered from marked chronic bronchitis with asthma.

CASE XI.—This history is interesting not only because of the cocaine anæsthesia but because the case is rare.

A.B., aged eighteen years, was sent to the hospital from the dispensary by Dr. Meierhof, of the throat department, on account of impending œdema of the glottis. There was already translucent swelling which obliterated the landmarks of the left half of the larynx, and filled the aryepiglottic fold on that side. There was, too, a slight fulness of the left side of the neck externally, and one could find a point of well localized tenderness in the fold or angle between the anterior border of the left sterno-mastoid and the larynx, at the level of the top of the thyroid cartilage. There was as yet no dyspnœa, but there was considerable dysphagia and some fever. On account of the condition of the larynx I feared spasm from ether or chloroform, while I knew that the amount of dissection probably necessary could not be well done under nitrous oxide. It was therefore decided to use cocaine. (The operation was in the summer of 1894.)

An incision about two and a half inches long was made in the angle already mentioned, and the dissection carried down to the posterior part of the thyroid cartilage, where, at the base of the superior cornu, a small abscess, probably a suppurating lymph-node, was found and thoroughly evacuated. The œdema was completely checked and the patient made a good recovery. It was several days before all vestiges of the translucent œdema entirely vanished from the larynx. The only pain felt during the operation was at the opening of the abscess itself, the free dissection being easily borne.

It is certainly uncommon to get hold of a case of œdema of the larynx at such a favorable time. I would call attention, too, to the advantage of striking directly at the cause of the

œdema rather than to temporize, as is too frequently done, by scarification of the œdematous parts.

In this case local anæsthesia was of much assistance to me in finding the abscess, for the patient was able to tell me when I approached the focus. There were not more than three or four minims of pus present.

The following history will show the value of the nitrous oxide, and will illustrate how a truly grave operation may be performed with its aid:

CASE XII.—Mrs. A. S., seventy years old, was operated upon at Mt. Sinai Hospital May 27, 1897. She had been admitted about two weeks before in a septic condition from gangrene of the great toe. She was old beyond her years and very feeble, and her arteries were markedly sclerosed. Fearing the two usual anæsthetics, I amputated the toe under nitrous oxide, making at the same time free incisions for drainage and packing the entire wound. The gangrene extended in spite of all I could do, and invaded the tissues pretty well up the leg, the patient becoming more and more septic, so that I was at last obliged to advise amputation of the thigh as a life-saving measure. The old lady had taken the gas so well at the former operation that I decided upon this anæsthetic for the amputation.

Preparations were made with special reference to speed in operating, each assistant being ready to do his work quickly when the time for it should come. The administering of the gas, being of the greatest importance, was intrusted to Dr. Goodman, the house-surgeon. A rubber constrictor was placed round the thigh and was tightened the moment that anæsthesia was established, the patient at this time groaning as if in pain. When cyanosis was well marked with full anæsthesia the amputation was begun. The circular method was practised, with skin- and muscle-flaps, bone section being made at the junction of the lower and middle third of the thigh. All visible bleeding vessels were tied, but no sutures were put in. The entire time consumed from the first cut to the end of the operation was twelve and a half minutes, the dressing occupying about four minutes more.

During the operative work the patient kept up a loud groaning, and I feared that she might have felt pain, but on my anxious

inquiry afterwards she assured me that all she felt was a tickling sensation.

I am glad to say that this old lady made an excellent recovery, the flaps being later drawn together with adhesive plaster. It interested me much to note after this severe operation in so feeble a subject the complete absence of shock. Indeed, the patient felt so well that she drank an eggnog within half an hour after she was put to bed, and there was no vomiting whatever.

In this paper I have tried to revive interest in anæsthesia other than by ether and chloroform, or their combinations, with the principal object of urging the propriety of considering *every kind* of anæsthetic agent in deciding upon the proper one to be used in any individual operation. We have accustomed ourselves to ether and chloroform to such an extent that only in very exceptional cases do we think of the possibility of doing serious surgical work without them. Yet there are, I am sure, many major operations which can be better and more safely done with the help of local anæsthetics, and that it is merely the force of habit which keeps us in the old rut.

I believe that in such operations as castration, colotomy, herniotomy by the method of Bassini, and other similar methods, cholecystotomy, drainage of empyema of the thorax, and, on the evidence of Abbe, gastrostomy, local anæsthesia should be our first choice instead of our last.

THE TREATMENT OF FRACTURES OF THE
LOWER EXTREMITY. CLINICAL REPORT
OF FOUR HUNDRED AND FIFTY CASES
TREATED IN THE METHODIST EPISCOPAL
HOSPITAL IN THE CITY OF BROOKLYN.

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THE following observations are based on the experience in the treatment of fractures of the lower extremity during the first decade of the work of the Methodist Episcopal Hospital in Brooklyn. These fractures include 111 of the femur, 34 of the patella, 286 of the bones of the leg, and 19 of the bones of the foot. Owing to the restricted accommodations of the institution, the stay of patients in the hospital has always been abridged as much as possible. The almost universal use of plaster of Paris in the treatment of fractures of the leg has permitted this to be done in this class of injuries, as a rule, long before consolidation of the fracture. For this reason also the ambulatory treatment of fractures of the bones of the lower extremities, by which these cases are able to walk and bear their weight upon the limb containing the broken bone, has been welcomed and brought to a high state of perfection.

In the wards of this hospital this method was introduced and systematically carried out for the first time in America; and the first report published in the English language of a series of cases treated by this method was based upon these cases.

In the following report, cases are spoken of as being discharged cured, improving, or improved. The first means that the case was continued under the care of the hospital until firm bony consolidation had been attained, or until the most perfect result possible had been secured. Thus cases of traumatic amputation were discharged cured when the stump had healed. The cases discharged as improving are those in which the pathological conditions had been remedied and the healing was progressing without complications or danger of the same. These represent the cases which were put up in immobilizing apparatus, retained in the hospital a short time to see that everything was going well, and discharged under the conditions alluded to above. The cases discharged improved are those which did not die nor were included under either of the other above-mentioned conditions.

Under this heading are the cases with soft union, faulty union, and those which refused treatment. Many of the fatal cases died from conditions which would have proved fatal had there been no fracture of the bone in question.

The only unfortunate result known which has been due to a plaster dressing was in a case treated by the ambulant method for fracture of the bones of the leg. The patient had been discharged in good condition with instructions to return for observation in five days. This he failed to do; and two weeks later presented himself at another hospital with sloughing of the muscles about the fracture.

Femur.—*One Hundred and Eleven Cases.*—Thirty of these were complicated with fractures of other bones. Twenty-seven died from other injuries or diseases. There were eighty-eight simple fractures, fourteen compound, eight compound comminuted, and seven simple comminuted.

Three cases were admitted for soft union. Bloody operation was done for the correction of irreducible displacement

in three cases, five cases of compound fracture were operated upon for the same purpose, and five cases were operated upon for soft union. Two cases were subjected to amputation of the thigh. Eighty-one cases were discharged cured, seven improving, and two with soft union. *Out of seventy cases of complete fracture of the shaft or neck, in which the exact measurements have been recorded, there was no shortening in thirty-six cases, less than one-fourth of an inch shortening in twenty cases, from one-fourth to one-half inch shortening in eight cases, from one-half to three-fourths of an inch shortening in three cases, from three-fourths to one inch shortening in two cases, and two inches shortening in one case.* There were three cases in which both femora were broken. There were two cases of separation of the lower epiphysis.

Of the seventeen cases of fracture of the neck of the femur, one was complicated by fracture of other bones, four died from other injuries or diseases; all were simple fractures; seven were impacted; twelve were discharged cured; one was discharged with soft union. There was one-fourth inch shortening in two, one-half inch shortening in one, and no shortening in six cases. In the diagnosis of fractures of the neck the bony relations to Nélaton's line and to the ilio-femoral triangle have always been taken into consideration.

Of fractures of the shaft, four were in the upper third, twenty-three in the middle third, ten in the lower third, and sixty-four of unspecified location. There was one fracture of the lower end of the bone involving the knee-joint, and one oblique fracture of the shaft in which the lower end of the upper fragment penetrated the knee-joint.

Seventy-one of the fractures of the shaft were simple, fourteen compound, eight compound comminuted, six simple comminuted, and three were admitted for soft union. All of the cases operated upon were fractures of the shaft. Of the fractures of the shaft, sixty-eight were discharged cured, seven improving, and one with soft union.

Out of fifty-four of the cured cases, in which the time required for firm consolidation has been ascertained five were cured in four weeks, four in five weeks, four in six weeks, thirteen in seven weeks, eleven in eight weeks, ten in ten weeks, three in twelve weeks, three in sixteen weeks, and one in eighteen weeks. Of the seven cases discharged improving, three were discharged within four weeks and one in ten weeks.

The treatment applied to the majority of cases has been by means of the traction apparatus of Buck. Mole-skin adhesive straps are applied along the leg, extending as far up as the middle of the thigh. In fractures of the shaft of the femur coaptation splints are placed about the thigh, a long side splint is applied extending from the axilla to below the foot, the leg rests upon a sliding car and track, and the long side splint passes through a slot in the foot of the car to prevent rotation of the leg. The completed dressing is shown in Fig. 1. Careful measurements of the two legs, from the anterior superior spine of the ilium to the internal malleolus, having been taken, sufficient weight is applied to bring the fragments into position or to make the two limbs of equal length.

If by palpation it can be determined that the position is good, the measurements are disregarded; but usually, however, this is not the case. As a rule, in adult cases from fifteen to twenty pounds traction is used. In many cases from twenty to thirty pounds are employed. And as much as forty pounds have been continued for two weeks. When such traction has failed to effect satisfactory reduction, or when consolidation has not taken place, in cases in which the delay of union could only be due to local conditions, there has been no hesitancy in cutting down upon the fracture.

In cases in which this has been done there have been found the following conditions which were preventing satisfactory reduction or delaying union: loose fragments of bone

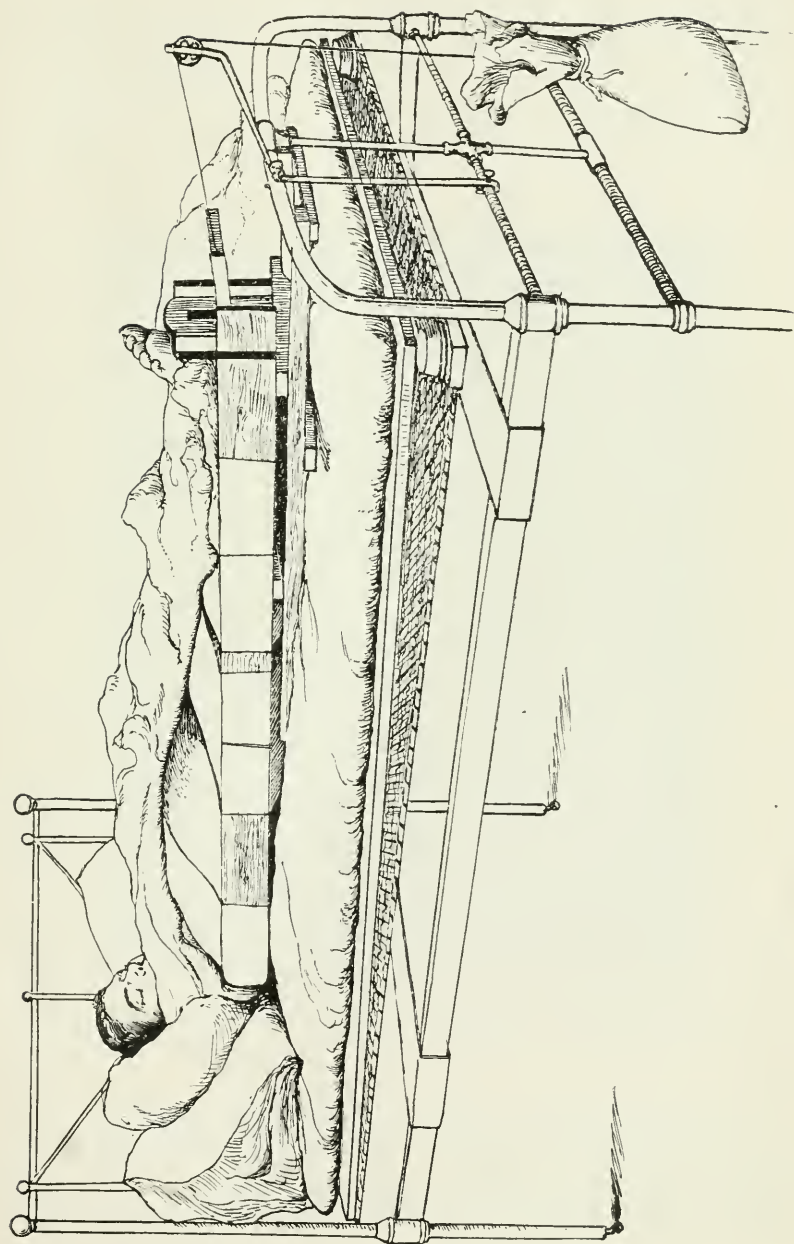


FIG. 1.—The completed dressing for fracture of the shaft of the femur in the adult. (Method in ordinary use.)

tilted transversely between the two main fragments, their periosteum lying in contact with the rough bone-ends; muscular tissue or fascia interposed between the bone-ends; simple overriding; overriding which was irreducible by traction because of peculiar displacement and obliquity of the fracture.

All of these conditions have also been found in the primary operations upon compound fractures. In some cases it was found necessary to wire the bones together in order to insure satisfactory apposition. This has been done always with silver wire, which in some cases has been buried completely, and in others the ends of the wire have been allowed to escape through the wound, so that the wire might be removed after the formation of a sufficiently firm callus. In one case of soft union operated upon, perfect apposition was found and consolidation was hastened by boring the bone-ends. When firm consolidation has taken place the extension apparatus is replaced by simple coaptation splints for one week, at the end of which time the patient is allowed to use the leg, first going about on crutches, and then using a cane.

Several cases in old persons have proved fatal from disturbances associated with hypostatic congestion of the lungs. The percentage of fatalities from this cause has been much less during the latter part of the decade, for the reason that in this class of cases more attention has been given to the general condition of the patient, and the persistence in the aim of securing a perfect local result has been relaxed and made a matter of secondary consideration when the general vitality showed signs of flagging. Thus aged persons were sometimes stripped of apparatus and placed upon a water-bed, or gotten up in a chair, before consolidation had taken place.

In the very young, children less than four to five years of age, the method of treatment commonly pursued has been by means of perpendicular extension. In this, the mole-skin straps are applied as in adults, and over this coapta-

tion splints or plaster of Paris; the foot is then elevated till the leg is in the perpendicular position, and the extension cord is passed over pulleys, the first of which is directly over the foot. Children bear confinement in this position remarkably well, and eminently satisfactory results have thus been secured. (Fig. 2.)

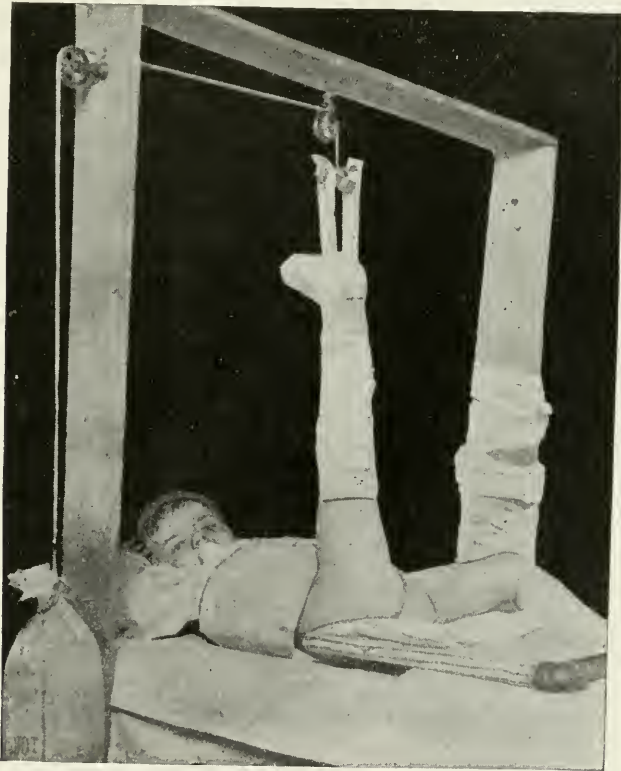


FIG. 2.—Showing method of using vertical suspension in treating fractured femur in a child.

The cases in which the knee-joint has been involved have all been cured without stiffness of the joint. The X-ray has been used in the locating of fractures, in the determining of their character, and in discovering the positions of the fragments.

The ambulant method of treatment has been employed in three cases as follows:



FIG. 3.—Common traction hip-splint used as an ambulatory appliance in fracture of the shaft of the femur. (Photograph from a case of compound fracture of the femur.)

tion of the middle and lower thirds and one-half inches shortening. Ten pounds traction reduced the shortening to one and one-half inches. Twenty-five pounds

Male, thirty-eight years. Compound fracture in upper part of middle third of shaft. Lacerated anterior wound, much overriding of fragments. The wound was enlarged, clots and lacerated muscle were removed, posterior counter-opening was made, and bones brought together. Buck's traction applied. Non-infective healing of wounds. At the end of three weeks, metallic ambulatory splint was applied (Fig. 3), and with a lift under the other foot the patient walked about with comfort, using crutches, though he was able to walk with a cane. This splint was so arranged that the weight of the body was borne upon the tuberosity of the ischium, when a step was taken on the injured side. At the end of six weeks after the injury the splint was removed and solid union found. Measurements showed the injured leg to be one centimetre longer than its fellow.

The second case was as follows: Female, thirty-seven years. Fracture at the junction of the shaft. There were three and one-half inches shortening. Ten pounds traction reduced the shortening to one and one-half inches. Twenty-five pounds

traction was used for three weeks, at the end of which time there was one inch shortening. Operation: Fracture exposed and overriding of one and one-half inches found, which had not been overcome by the traction because of the peculiar position of the fragments and the obliquity of the fracture. A sharp end of bone was cut off, and the bones wired. The leg was put up with ten pounds extension. The wound healed primarily. Later the wire was removed. At the end of five weeks the patient was gotten up on an ambulatory splint, upon which, with a lift under the sound leg, she was able to go about with the aid of crutches. Ten weeks after the operation solid consolidation had taken place.

The third case was as follows: Female, twenty-seven years. Compound fracture in the middle third. The patient was poorly nourished and anæmic and six months' pregnant. The wound was enlarged and the interfering soft parts removed. Splints and traction were applied. The wounds healed aseptically. A dead foetus was removed from the uterus at the end of four weeks. There was soft union at the end of three months. Operation: Good position of the fragments was found, the only difficulty being in the non-consolidation of the callus. The bone-ends were irritated by multiple boring, and the wound was closed. The patient was gotten up on a Thomas splint, with a lift under the other foot. (Fig. 4.) She went about on crutches, and at the end of four months after the operation solid union had taken place.

In another case the latter part of the treatment was conducted with the use of an ordinary Thomas hip-splint, by which the period of confinement in bed of an aged patient was shortened: Female, seventy-six years. One inch shortening. Six pounds traction made the injured leg one-half inch longer than its fellow. Examination by the X-rays at the end of three weeks showed the fracture through the lower part of the great trochanter and thence obliquely through the shaft. Traction was continued for six weeks, at the end of which time consolidation was not quite completed. The splint was applied and the patient was able to go about on crutches, and was discharged.

Patella.—*Thirty-four Cases.*—There were twenty-nine recent simple fractures, one compound fracture, and six ad-



FIG. 4.—“Thomas” hip-splint used as an ambulatory appliance in fracture of the shaft of the femur. (Photograph from a case of compound fracture of the femur.)

mitted for operation for soft union. There were two cases in which fractures of both patellæ were operated upon, and two more cases in which there was an old fracture with soft union in the opposite patella which was not treated. With two exceptions, the fractures have been nearly transverse and near the middle of the bone.

In twenty of the recent fractures the joint was opened by incision over the patella, blood and exudate removed, the torn periosteum, which had fallen between the fragments, trimmed away, the bone-fragments sutured together, the wound closed, and the leg put up on a posterior splint. In all of these twenty cases primary healing took place and solid bony union was secured. The bone was united by silver wire sutures in twelve cases, by silkworm gut in five, by kangaroo tendon in one, and by chromicized gut in one case. The fragments were drilled and the sutures passed through the bone in all but the last case, in which it was sufficient to suture the periosteum.

In three cases the patella was encircled by a subcutaneous suture, which was pulled up and tied and the leg put on a posterior splint. Silk was used in one case and chromicized gut in two cases. One of the latter suppurated, but gave no serious trouble. Good fibrous union was secured in these cases. Non-operative mechanical appliances were used in four cases. In three of these approximation was effected by means of rubber elastic bands attached to the skin by adhesive straps or operating between circular plaster cases. In one case the leg was simply put up on a posterior splint. In one case there was a perpendicular fracture. In this the bone was exposed by operation, the blood was removed from the joint, and the wound closed. Aseptic and perfect healing took place. One case died on the third day with delirium tremens. One was put up on a splint and removed home on the second day.

In the six cases admitted for operation for fibrous union the bone was exposed, the intervening fibrous material cut

out, and the fragments sutured as in the recent fractures, wire being used in four cases, and kangaroo tendon and silk-worm gut in the other two. In one case there was an old fracture of the patella, with fibrous union, and the patient was admitted to the hospital with a transverse fracture of the lower fragment. Both fractures were sutured. Primary healing, solid bony union, and a good joint result were secured in these cases.

In the twenty-seven operations in which the knee-joint was opened and the bone-fragments sutured together there was no septic joint-disturbance, and primary healing occurred in all cases. It was demonstrated in all of the recent transverse fractures that bony approximation would have been absolutely impossible without operation, because of the intervention of blood-clot and torn periosteum. These cases confirmed the statements made by Macewen that in the breaking of the bone the anterior fibrous covering of the patella becomes stretched out and, as it separates and finally becomes torn across, the ragged edges drop down over the broken bone-surfaces. In the space between the two fragments a solid clot forms, and bony apposition is rendered impossible.

Of the twenty-one recent fractures operated upon by opening the joint, one was operated upon within twenty-four hours after the injury, one on the third day, one on the fourth day, two on the fifth day, three on the seventh day, six on the tenth day, six on the fourteenth day, and one on the fifteenth day. The length of time of postponement of the operation depended upon the amount of contusion and effusion about the joint. The local treatment before operation consisted in immobilization of the knee-joint by means of a posterior splint, and the constant application of an ice-bag over the swollen knee. In about three-fourths of the cases drainage was secured by means of a narrow strip of gauze or a small tube inserted at either side of the patella. In some cases openings for the drainage were made in the ends of a transverse wound. The gauze or tubes were re-

moved on the second day or soon thereafter, having been inserted to serve the temporary purpose of conducting from the joint the serous secretions immediately following the operation. Drainage has been used much less during the latter part of the decade; and cases have done equally well without it. A method which lately has been practised with great satisfaction consists in uniting the bones by chromicized sutures passed through the bone, suturing over these the periosteum with interrupted chromicized gut sutures, closing the joint capsule by a continuous suture of fine gut, suturing the subcutaneous fascia in the same manner, and finally closing the skin with a subcuticular suture of silk. Passive motion has been commenced from the third to the sixth week after the operation, usually on the fourth or fifth week.

Most of the cases which were operated upon for fibrous union came to the hospital with the history of an old fracture which had received non-operative treatment. The usefulness of the limb had been good at first, but the fibrous connection had gradually stretched until the usefulness of the limb had become much impaired.

Two cases of recent fracture had been operated upon before by wiring. They are as follows:

CASE I.—Male, aged nineteen years. Had been operated upon in hospital four months before. A strong and flexible leg was the result. While wrestling a second fracture of the same bone occurred. Immobilization and cold for seven days. Operation: The fracture was found in the old line of union. The wires had broken at the place of twisting. Reunited. Walking and passive motion were begun on the fifth week. Perfect result.

CASE II.—Male, aged forty years. Had been operated upon in hospital eight weeks before. Three weeks after leaving the hospital cured he struck the knee and sustained a second fracture. Five days later, operation: The previous fracture had been squarely transverse, the last fracture was found to pass obliquely across the old line of union, which was perfectly solid. One wire was found broken, the other had torn out of the bone.

Fragments reunited, and patient was discharged cured at end of six weeks.

Tibia and Fibula.—*Two Hundred and Eighty-six Cases.*
—One hundred and thirty-six of these were fractures of the shafts of both bones of unspecified location, twenty-eight were fractures of the shaft of the tibia, and twenty-one were fractures of the shaft of the fibula of unspecified location. There are designated eight fractures of the upper thirds of both bones, fifteen of the middle, and twenty-six of the lower thirds; four of the upper third of the tibia, one of the middle third, and thirteen of the lower third; three of the upper third of the fibula, one of the middle third, and thirty of the lower third. These are equivalent to 185 cases of fracture of both bones, forty-six of the tibia, and fifty-five of the fibula. One hundred and eighty of these were simple fractures. There were ninety compound fractures, of which number, fifty-six were compound comminuted, five were simple comminuted; nine were admitted for soft union, and three for faulty union.

There were no bloody operations done on simple fractures for the immediate correction of defective position. Twenty-eight compound fractures were operated upon for the removal of loose bone or lacerated muscle or the suturing or wiring of the fragments. Five cases of soft union in fractures of the lower third of both bones were cured by exposing the bone-end and removing the intervening fibrous tissue. Three cases of faulty union were operated upon and cured. Amputation of the leg for compound fracture was done in twenty-five cases, and amputation of the thigh in seven cases. One hundred and thirty-six cases of simple fracture were discharged cured, and fifty-five were discharged improving. Sixty-nine compound fractures were discharged cured, and eleven were discharged improving. Twelve cases died, either of fatal injury sustained at the time of fracture, or of intercurrent disease. The ambulatory treatment was employed in twenty-eight cases. In four fractures of the tibia the knee-joint was involved, and in nine the ankle-joint.

Three cases of delayed union were treated and ultimately cured by exposing the fracture and drilling the bones.

The great majority of these cases were brought to the hospital by the ambulance. The immediate treatment by the ambulance surgeon consisted in exposing the limb, correcting the deformity, and applying coaptation splints padded with cotton. In the cases of compound fracture a copious dressing of wet corrosive sublimate gauze is applied over the wound.

When the case is brought to the hospital, if satisfactory reduction cannot be effected because of muscular spasm or pain, there is no hesitancy, if there are no contraindications, in administering a general anæsthetic. The simple fractures are treated by the application of a plaster-of-Paris case. In the fractures above detailed this has been applied after the swelling had somewhat subsided, usually about the seventh day. More recently it has been found more satisfactory to apply this splint immediately if it can be done before the swelling has begun. Indeed, the more perfect immobilization and the even pressure effected by the plaster, when early enough applied, prevents the swelling. This has been done with great satisfaction in a number of cases. Before applying the plaster the condition of the skin is looked to. Excoriations are covered with mild antiseptic ointment spread upon dry gauze. Serous blebs are opened at their most dependent part, or the loosened skin cut away, and the surface covered with zinc oxide powder. The plaster bandage is usually applied immediately over a flannel bandage. During the last two years a simple white cotton stocking, instead of the flannel bandage, has been much used as a covering for the skin. In these dressings the toes are always left exposed; and usually in all fractures of the leg, with the exception of fractures of the lower extremity of the fibula or incomplete fractures, or fractures of the inner malleolus, the splint is extended above the knee.

In the treatment of compound fractures, the patient is taken at once to the operating-room, and, if there is a con-

siderable wound, the dressing is conducted under general anæsthesia. The whole leg is thoroughly scrubbed with soap and water, the skin about the wound shaved and cleansed with ether, and then with 1 : 2000 bichloride solution. The wound is then irrigated with the same solution. If the injury to the soft parts is but slight, the displacement of bone inconsiderable, and the amount of hæmorrhage and effusion small, the wound is partly sutured, leaving a small opening for drainage. If the wound is but a mere puncture of the skin, with no other conditions to distinguish the fracture from the simple sort, the wound is simply covered with moist antiseptic gauze after the usual cleansing. These small wounds are never hermetically sealed. If the examination shows that there is considerable injury to the soft tissues, or irreducible displacement, or the presence of foreign matter, the wound is freely enlarged, or such new wounds are made as shall give access to the seat of injury. When necessary, the number of longitudinal wounds are multiplied, for in these cases it is considered that abundant provision for drainage is desirable. Ruptured muscles, tendons, and nerves are repaired and vessels ligated. Fragments of bone which are detached from their vital connections are removed. The wounds are closed after the introduction of tube or gauze drainage. The leg is put up on a temporary splint, and at the end of from two to six days, varying with the degree of the patient's temperature and other signs, the wound is dressed, and the drainage dispensed with unless there remains some special indication for its continuance. At as early a stage as possible a permanent plaster splint is applied, with fenestra for dressing the wounds without removing the splint. This is done as follows: A small dry dressing, quadrilateral in shape, having been applied, and the dressing covered with impervious oiled muslin, the plaster bandages are applied as in the case of a simple fracture. Before the plaster has become thoroughly hardened, a fenestrum, outlining the dressing, is cut out. The oiled muslin is then cut through and reflected back over the four edges of the fenestra.

trum in such a way as to prevent any moisture, which might come from the dressings, softening the plaster case. When more than one fenestrum is required, or when the fenestrum involves much of the circumference of the case, the case is strengthened by incorporating into it a strip of bass-wood or a metallic splint. The same end is sometimes accomplished by introducing an iron strap, which passes down as far as the fenestrum and then leaves the case and curves over the opening to re-enter the case below. (Fig. 5.) Any of three conditions arising in compound fractures have justified amputation,—injury to the blood-vessels so great as to cause the death of the parts, uncontrollable suppuration, and wide loss of bone substance. The only cases which have been subjected to amputation for suppuration are cases which were not brought to the hospital immediately after the injury, but when suppuration and septicæmia were well advanced.

In a large percentage of the compound fractures primary healing occurred, and in most of those in which drainage was

used the drainage was quickly dispensed with. In a number of cases of compound comminuted fracture of the tibia, in which fragments of bone were removed, a resection of a



FIG. 5. — Fenestrated ambulatory plaster dressing. (Photograph of case of compound fracture of one leg and traumatic amputation of the other, result of a torpedo explosion.)



FIG. 6.—Comminuted fracture of the bones of the leg from crush under a car-wheel, requiring amputation.

portion of the fibula was done in order to permit the tibial fragments to come together. An ultra-conservative policy has been pursued in the treatment of this class of cases; and primary amputation has been done only when the death of the limb was a certainty or when the irreparable loss of bone was so great as to render the leg useless. Fig. 6 illustrates an extreme degree of comminution of bone requiring amputation.

The ambulatory method of treatment has been practised in thirty cases, in all with generally satisfactory results. The splint is applied in the following manner: The first step consists in the reduction of the fracture and the cleansing of the skin with soap and water. Then a white cotton stocking is pulled on over the leg, the tip of the stocking being cut out to expose the toes. A padding of ten or twelve layers of cotton wadding, making a sole about an inch thick, is placed beneath the foot. Over this is now applied the plaster bandage from the base of the toes to just above the knees, especial care being taken that the application is made smoothly and somewhat more firmly than is the custom with the ordinary plaster case. The layers of bandage are well rubbed in as it is applied, with the view of securing the greatest degree of firmness with the smallest amount of material. The sole is strengthened by incorporating in with the circular turns an extra thickness composed of ten to twelve layers of the plaster bandage, well rubbed together and extending longitudinally along the roll. The splint is made especially firm about the enlarged upper end of the tibia. The foot is strengthened by a piece of wire netting along either side of the foot. The assistant who stands at the foot of the table keeps the foot at a right angle and makes such traction or pressure as is required to keep the fragments in position. The operation requires about twenty minutes; and by the time the last bandage is applied the splint should be fairly hard. (Fig. 7.)

It is seen that when this case has become hardened the leg is suspended. When the patient steps upon the sole of

the splint, the thickness of the cotton beneath the foot separates the sole of the foot so far from the sole of the case that the foot, attached to the lower fragment, hangs suspended in



FIG. 7.—The ordinary ambulatory plaster dressing for fracture of the leg.

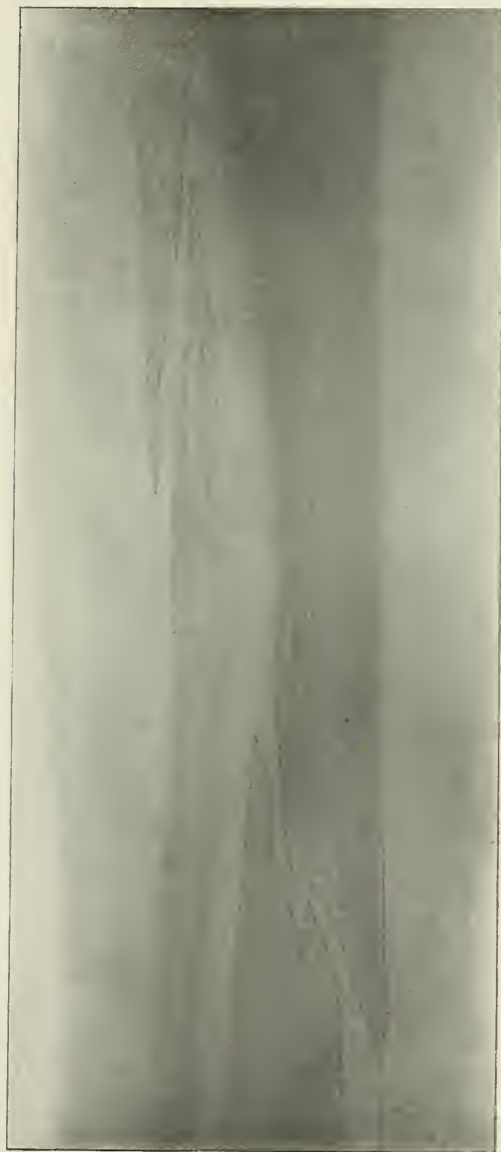


FIG. 8.—Radiograph of the bones of the leg treated by ambulatory dressing; patient recumbent.

its plaster shoe. Thus the weight of the body which would come upon the foot is borne by the diverging surfaces of the leg above the fracture. The chief of these is the head of the tibia. A lesser *rôle* is played by the head of the fibula, the patella, and the tapering calf in muscular subjects. This apparatus has been usually applied at periods varying from eighteen hours to seven days after the injury. It has been used with success in cases of oblique fracture of both bones above the middle of the leg. As an example of the practicability of the method the following case may be cited:

Peddler, aged eighteen. Fracture of tibia and fibula a little above the middle of the leg. Walking-case applied two days after the injury. On the following day he walked about the ward almost as though the leg were sound. This patient was able to walk without the aid of a cane. He was discharged from the hospital, returning for subsequent observation till the end of the sixth week, when the case was removed and a perfect result found.

Many patients, in contrast with this, walk with difficulty because of timidity and a feeling of insecurity in the limb. Some suffer pain when standing on the broken leg. This pain is sometimes referred to the seat of fracture and sometimes to the inferior aspect of the bony prominences of the knee. Usually the patients walk comfortably with the assistance of a cane. At any rate, when the patient refuses to walk, his splint subserves the purpose of an ordinary plaster case.

Of late it has been practised to take an X-ray picture of the broken leg-bones in the horizontal position after the application of the walking-case, and then a picture showing the relations of the fragments as the patient stands upon the broken leg. These pictures show that when, according to outward appearance and the measurements of the leg, the fragments would seem to be in perfect apposition, there may be considerable separation or overriding of oblique fractures. Such an illustration also shows that when the patient

stands down upon a leg in which the tibia and fibula are obliquely broken, the distance from the ankle-joint to the

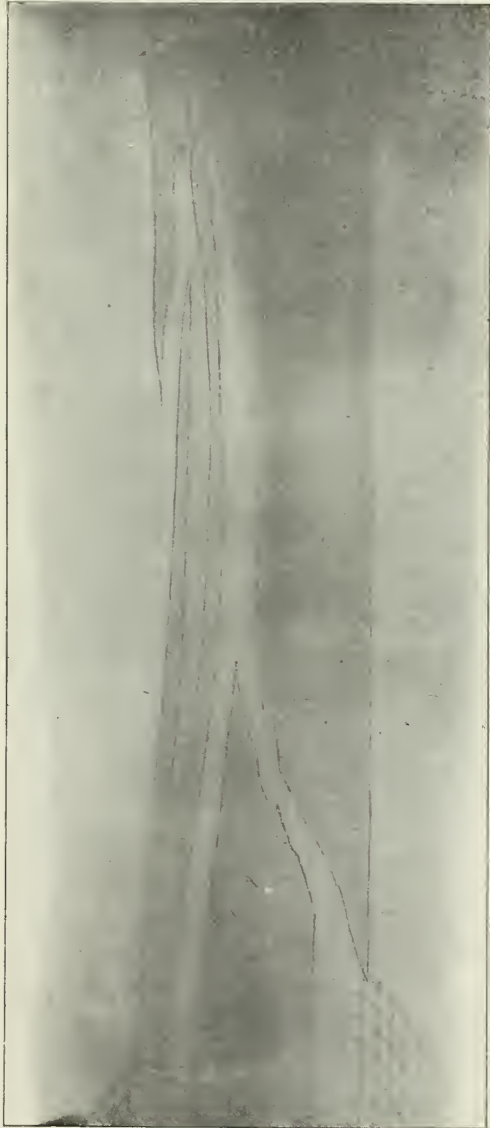


FIG. 9.—Radiograph of the bones of the leg treated by ambulatory dressing; patient standing.



FIG. 10.—Radiograph of the bones of the leg treated by ambulatory dressing; same case as in Figs. 8 and 9, six weeks later, fracture consolidated.

knee-joint is greater; that is, that there is less tendency to overriding than when the leg is in the horizontal position. This bears out the theory of the ambulatory dressing used in these cases,—that the lower fragments, with the foot, hang suspended in the splint. Fig. 8 shows the relations of the fragments of the bones, after application of dressing, while the patient is still recumbent; Fig. 9, the relations of the fragments while the weight of the body is being sustained upon the injured limb, as in walking; Fig. 10, the same case, six weeks later, after full consolidation of the fractures has taken place.

Tarsus, Metatarsal Bones, and Phalanges of Foot.—*Nineteen Cases.*—Ten of these were fractures of tarsal bones, five were fractures of metatarsal bones, and four were fractures of phalanges. Of the fractures of the tarsus, two were crushing injuries of the foot requiring amputation of the leg, two were compound fractures of the os calcis, one was a fracture of both os calcis and astragalus, and five were fractures of the astragalus. As a result of a fall of twenty feet, one patient sustained a fracture of each astragalus. This case was treated by the ambulatory splint. The other cases of fracture of tarsal bones were treated in the ordinary plaster splints. Two of the fractures of the metatarsal bones were simple and three were compound. The simple fractures were put up in the plaster dressing. All of the fractures of the phalanges were cases of traumatic amputation excepting one, which was a simple fracture.

CONTRIBUTION TO THE STUDY OF APPENDICITIS OBLITERANS.

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MUCH time has been devoted to the clinical study of appendicitis and to the gross anatomy of the vermiform appendix in health and disease, but comparatively little attention has been given to the microscopical structure of that organ. In the literature of the day one constantly finds intimations that the appendix is an intestinal tonsil; that its so-called muscular coats are in reality mostly composed of fibrous tissue; that the mucosa is formed of adenoid tissue, which is not collected into follicles such as are found in other parts of the gut, etc. Having recently had an opportunity to make a microscopical examination of a number of appendices, both healthy and diseased, it may not be without interest to note some of the results of these examinations. The present paper will deal exclusively with the histology of normal appendices and of those affected by obliterative disease. The walls of the appendix consist of five coats or tunics,—to wit, the mucous, submucous (containing the principal vascular supply), circular muscular, longitudinal muscular, and the peritoneal. The thickness of the mucous membrane varies greatly. In none of the specimens of normal appendices examined by me has it been possible to retain the epithelial lining of the mucosa. This failure is possibly due to the specimens having been obtained too long after death. The mucosa is provided with tubular glands lined by columnar epithelium. These mucous glands are very numerous at the distal extremity of the organ. The deeper layers of the mucosa are exceedingly rich in adenoid material, which

shows a marked tendency to be arranged as *distinct follicles* or solitary glands. Between the *masses* of adenoid material similar material is observed scattered throughout the whole mucosa. Between the mucous membrane and the submucous

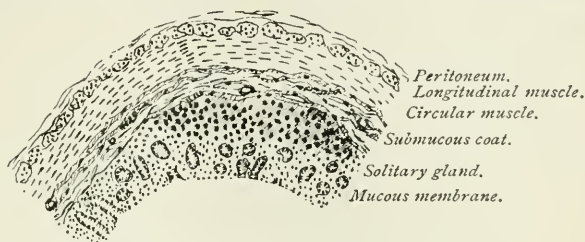


FIG. 1.—Transverse section normal vermiform appendix.

coat there is a delicate muscularis mucosæ. The submucosa is a thin layer of connective tissue which contains numerous blood-vessels. Fowler, in his excellent series of articles on appendicitis, published in the *ANNALS* (1894), states that the

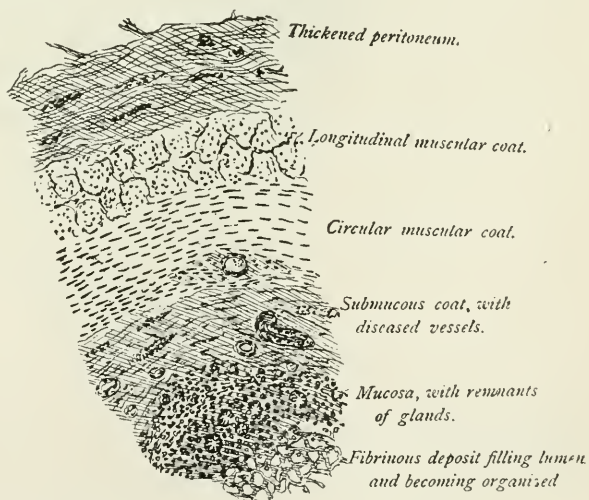


FIG. 2.—Early stage of exudative appendicitis obliterans.

inner muscular coat consists mainly of fine fibrous tissue arranged in a more or less circular manner, the outer of a few longitudinal non-striated muscular fibres mixed with a varying amount of fibrous tissue. He further mentions that

Austin Flint denies the existence of these muscular fibres. Hartley (Dennis's "System of Surgery," iv, 392) says that the inner muscular coat consists of fine fibrous tissue arranged circularly with a smaller amount of muscular fibres; that the outer coat is mainly fibrous tissue with distinct bundles of longitudinal muscular fibres.

Appendicitis Obliterans.—Senn, in his classical paper on this subject (*Journal of the American Medical Association*, March 24, 1894), considers that occlusion of the vermiform

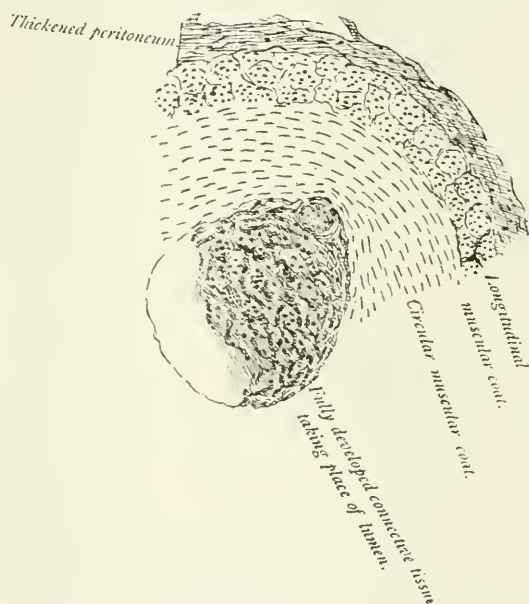


FIG. 3.—Complete obliteration of appendicular lumen.

appendix may be due to the following causes alone or in combination: (1) Destruction of the mucous membrane by ulceration; (2) infiltration, thickening, and contraction of the muscular coat; (3) prolonged cicatricial contraction of exudates upon its serous covering. In the conclusions formulated at the end of his paper the same author states that appendicitis obliterans "is characterized by progressive obliteration of the lumen of the appendix, by the gradual disappearance of the epithelial lining and glandular tissue, and

by the production of granulation tissue, which by transformation into connective tissue and by cicatricial contraction starves out remnants of glandular tissue, and finally results in obliteration." He further says, "The incipient pathologic changes occur either in the mucous membrane of the appendix or as an interstitial process following lymphatic infection."

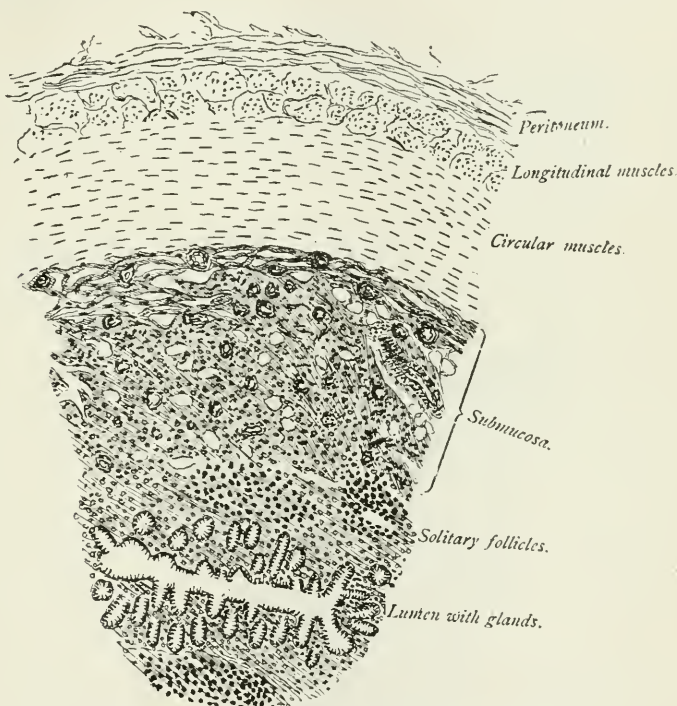


FIG. 4.—Early stage, third type of appendicitis obliterans.

Among the appendices placed at the present writer's disposal, through good fortune and the courtesy of friends, there were found three distinct types of obliterative disease.

TYPE 1.—In the early stages of this form of the disease the lumen of the gut is filled by a coagulated fibrinous material, the mucous membrane is densely infiltrated by round cells, and its glands are few in number and indistinct. Here and there the mucous membrane is absent. The outer or

peripheral portion of the fibrinous deposit is infiltrated by cells similar to those in the mucosa, so that no distinct line of demarcation can be drawn between the mucosa and the coagulum filling the gut lumen. The state of affairs presented is exactly similar to that seen in the so-called organization of any aseptic animal material implanted in the living body. The muscularis mucosæ is well marked and is infil-

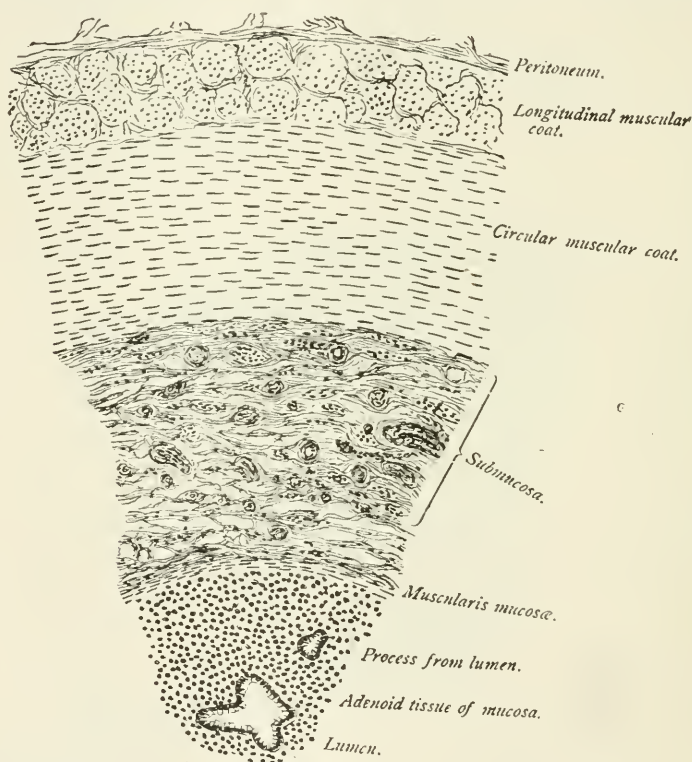


FIG. 5.—Late stage of third type of appendicitis.

trated by round cells. The submucosa is thickened and contains numerous blood-vessels. Many of the vessels show abnormalities, some having their *intima* others their muscular coats thickened. Both the circular and longitudinal muscular tunics are well marked. The peritoneal coat is much thickened and is very vascular. In a more advanced stage

of the process (Fig. 3) the fibrinous deposit is replaced by granulation tissue,—*i.e.*, it is organized in the same way as an aseptic blood-clot. The granulation tissue matures, and instead of the appendix having a lumen it has a firm fibrous core. The mucous membrane is destroyed. This form of appendicitis is analogous to plastic pleuritis, where the visceral and parietal pleuræ are united by a fibrinous deposit, which becomes organized.

TYPE 2.—In this form of obliterative appendicitis the main seat of activity is the mucosa. The serous and muscular coats may or may not be thickened, and the submucosa may be practically healthy. In none of the sections examined do the outer layers of the submucosa show cellular activity, its inner layers generally contain embryonic cells. In the mucous membrane the connective-tissue elements become exceedingly active and embryonic. The granulation tissue thus formed separates the tubular glands from their usual surroundings and breaks them up, dividing individual epithelial cells one from the other or scattering them in bunches. The place of the lumen of the gut is taken by a mass of granulation tissue enclosing broken-down and irregularly disposed gland tubules. The granulation tissue seems to be formed in a mass and has to spread in the direction of least resistance, and carries along with it the tubular glands as a glacier carries stones. After filling the lumen the granulation tissue shows a marked tendency towards development.

TYPE 3.—There is a third form of appendicitis obliterans which is very clearly differentiated from the preceding types. In this the seat of the disease is the submucous and muscular tunics. The peritoneum is involved, probably in most cases, certainly in all examined by the author. In the earlier stages of the disease the muscular tunics are markedly thickened by increase in the muscular elements, the submucous coat peripherally is composed of much mature fibrous tissue, while that portion next to the mucosa is cellular and youthful, being, in fact, granulation tissue. The whole submucosa is very much thickened. The submucosal vessels are numerous

and give excellent examples of endarteritis and periarteritis. The lumen of the appendix is lessened, but retains its columnar epithelial lining. The mucosa is well provided with mucous glands and solitary glands. Adenoid tissue is plentiful. In later stages of the disease the lumen of the gut becomes very small, retains its epithelial lining, but in the mucosa tubular glands are absent, and while in the sections examined there is a rich supply of adenoid tissue, it is diffused, and the solitary glands are notable from their absence. The submucous coat is now composed of mature fibrous tissue, the granulation tissue, noted in the earlier stages having evidently developed. The muscular and peritoneal coats are in the condition already described. (Figs. 4 and 5.)

TYPE 4.—The appendix, like other portions of the intestinal canal, is liable to be the seat of ulceration. Whether the loss of substance is confined to the mucosa or involves the other coats, the process of healing is the same. If recovery takes place, the defect is more or less completely filled by granulation tissue, which as it develops contracts, and so necessarily diminishes the lumen. If the ulceration is sufficiently extensive, complete obliteration of the whole appendicular lumen may result.

Any of the forms of obliterative appendicitis which have been described may occasion partial or complete occlusion of the appendicular lumen. Fortunately complete occlusion is extremely rare, while partial is exceedingly common. The result of partial occlusion of the appendix from obliterative disease is the well-known stricture of the appendix, which has a most important influence in the production of acute appendicitis. All cases of appendicitis obliterans are necessarily chronic. Most of the changes in the appendicular walls are due to nature's efforts to destroy, remove, or antagonize noxious influences, generally of a bacterial nature. It is only when the body is at least partially successful in this struggle that the series of histological developments described have time and opportunity to be elaborated. Undoubtedly appen-

dicitis obliterans may produce a cure just as a badly fitting and powerful truss occasionally cures a hernia.

Conclusions.—(1) There are *at least* four distinct varieties of appendicitis obliterans: (a) An exudative variety; (b) a variety characterized by mucosal hyperplasia and sclerosis; (c) a variety characterized by submucous and muscular hypertrophy; (d) a reparative variety.

(2) In all varieties there may be and generally is localized peritonitis.

(3) Endarteritis and periarteritis are almost constant phenomena in the disease.

(4) The vermiform appendix in health is distinctly muscular, in disease the muscle is often hypertrophied.

VARICOSE VEINS AND THEIR TREATMENT BY TRENDELENBURG'S OPERATION.

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MEDICAL SCHOOL.

VARICES, or ectases of the veins, were for a long period considered as simple dilatations of the vessel without any change in its tissues, but to-day we know that this understanding is erroneous. Varices are met with in various regions of the body, but only infrequently are they found in the head, mouth, vagina, or bladder. Sometimes the upper limbs may be the seat of the affection. The hæmorrhoidal veins and those of the spermatic cord are often the seat of venous ectasis, but by far the most common site for this pathological condition is the lower limb, and more especially in the domain of the saphenous vein.

According to their shape we have simple, cylindrical, cirroid, and serpentine ectasis; in the latter case there is also an elongation of the vessel. We often meet with cases presenting true nodes of varicose veins which form a tumor. Now, as varicose veins are, so to speak, a special affection of the saphenous vein, and as Trendelenburg's operation is performed for the relief of these cases, a few words regarding the situation of this vessel may not be perhaps out of place here, and which we will quote from Quain's "Anatomy," ninth edition.

"The external or short saphenous vein, smaller than the internal, proceeds from the outer end of the arch on the dorsum of the foot. It passes behind the outer ankle and ascends

in the leg along the outer border of the tendo Achillis, in company with the external saphenous nerve, and then over the internal, between the heads of the gastrocnemius, to the lower part of the popliteal space, where it perforates the deep fascia to end in the popliteal vein. Opposite the ankle and along the leg it communicates with the deep veins; and it receives superficial branches from the outer part of the foot and heel, and the back of the leg, as well as one which descends on the posterior surface of the thigh. A communicating branch passes from this vessel near its termination upward and forward to the internal saphenous vein, and sometimes the trunk itself follows this course, having no connection, or only a very small one, with the popliteal vein."

The deep veins may also be the seat of ectasis, as has been demonstrated by Verneuil, but these are far from having the clinical importance of the saphenous vein. The deep vessels are surrounded on all sides by hard and firm tissues which uphold and protect their walls, and, what is more, the muscular contractions greatly aid the circulation in the deeply situated veins.

In 1877, Bardeleben demonstrated that the veins of the lower extremities were very richly supplied with unstriped muscle and valves, for, of all the veins in the economy, these are most assuredly the ones that have the greatest amount of pressure to support, and, consequently, when the muscles and valves become insufficient, they will be more easily distended than others. The valves are of the greatest importance, because they divide the blood column into several segments, so that in the normal state this column does not bring all its weight to bear on the veins of the lower limb.

When the valves become insufficient, from no matter what cause, the entire weight of the blood column must be supported by the walls of the veins. Other factors may produce an increase in the pressure, such as an elastic circular garter, which is so frequently a cause, or a hernia truss having too much pressure over the crural canal. A stricture of the orifice in the fascia lata has also been mentioned as a cause of

varix of the saphenous vein. Pregnancy is particularly favorable for the development of ectasis, either by increasing the abdominal pressure or by direct pressure on the iliac vein and vena cava. A varix so produced does not always disappear after labor, even when the circulation is again in a normal condition, and, according to Lesguillon, 5 per cent. of women who have borne children are subjects to this affection, a statement that the writer believes to be correct. Cysts of the ovary and uterine fibroids have the same effect as a pregnant uterus.

Occupations obliging the subject to remain on his feet for hours at a time, such as postmen, shop-girls, waiters, soldiers, porters, etc., predispose to venous ectasis of the lower limbs, and it may be for this reason that men appear to be more often affected by this trouble than are women. Certain affections of the legs may produce varices, for example, a large callus or a cicatrix of the skin which directly compresses the subcutaneous veins. And, lastly, pulmonary emphysema or an organic disease of the heart may be set down as factors on account of the obstacles to the general circulation produced by them.

Venous ectases produced by these various causes develop slowly and progressively in most cases, but infrequently we meet with subjects whose veins became varicosed after a violent exertion or a contusion. But it must be said that an increase in the blood-pressure is not generally sufficient in itself to produce a varix, and it coincides with a pathological change in the walls of the veins. Billroth, Orth, Bardeleben, Ziegler, and Lesser have demonstrated this fact. The researches made by Cruveilhier and Cornil have demonstrated that the walls of the veins in a state of ectasis are thickened at certain parts and thinned at others. The middle tunic presents the most marked changes, and occasionally it is so very thin that some parts of the vessel will be entirely lacking in it, while at other points a true hypertrophy of the middle tunic will be present.

The condition of the vessel walls naturally varies with

the degree the morbid changes present, because it often happens that the middle tunic is in the first place hypertrophied and later on undergoes atrophy. Epstein demonstrated that dilatation of the veins produced a change in the walls of the vessels, and he clearly showed that hypertrophy of the middle tunic, followed by atrophy, is the process that takes place. This tunic, as well as the external, is more vascularized and presents a round-celled infiltration. The writer has always found the intima the seat of a formative endophlebitis, which decreases the size of the lumen of the vessel, and has also noted a dilatation of the vasa vasorum, with hypertrophy of their walls.

Dilatation of the veins always produces a slow circulation in the distant venous branches. This is what also occurs in the case of dilated arteries, and in both instances there is a neoformation in the tissues of the intima, with this difference that the neoformative process commences with a slight amount of change in the dilated arteries, while in the veins this change occurs later on.

According to their stage of development we can divide varicose veins into three degrees.

First Degree.—The veins are only *dilated*, without any pathological change in their walls. These dilatations may disappear after the cause has been removed, as, for example, after labor or the removal of an abdominal tumor.

Second Degree.—Here we have dilatation and deformity of the veins with hypertrophy of the middle tunic. If such a vein be cut across it will remain gaping and give rise to severe hæmorrhage.

Third Degree.—In this stage we have marked morbid changes in the vessel walls. Hypertrophy is everywhere, and often the middle tunic is so thin that it readily bursts, and at the points of rupture partial sacculated dilatations arise. On account of this dilatation the valves are prevented from coming in contact with each other, and insufficiency results.

It must be remembered that the valves are simply a reduplication of the intima, and consequently undergo the same

pathological changes as the walls of the vessel. After their function is lost they undergo fibrous contraction and may even disappear.

At a very advanced stage the vessel walls will have lost their elasticity; they are soft and imbibed with blood.

The blood in the first and second degrees of ectasis remains normal, only circulation is slower in the dilated vessels. In the third degree circulation is still slower, and coagulation takes place at certain points, and the clot thus formed obliterates more or less completely the lumen of the vein. This coagulation is not the result of the slow circulation, but is due to the morbid changes in the walls of the vessel.

The parts surrounding the diseased veins are altered. The cellular tissue is infiltrated with an inflammatory exudation, and sometimes its vascularization is increased. The skin is thickened and adherent, while the subcutaneous veins are dilated; or, on the other hand, it may be thin, shiny, and ulcerated. The pigmentation is the result of capillary extravasation and transudation of the red corpuscles.

The diagnosis of varicose veins is generally a simple matter. The process often commences by a dilatation of the cutaneous veins, which are first seen as bluish spots or pigmented points. When the patient stands the veins become turgescient, but if the leg be raised while the subject is in the recumbent position the ectasis becomes rapidly emptied, but will fill again as soon as the limb is in a declining position.

Varicose veins are more often larger in summer than in winter; they dilate when the patient takes a warm bath and contract by contact with a cold application. Slightly developed ectasis gives rise to hardly any symptoms, the skin is normal or nearly so and moves easily over the underlying tissues, the only thing complained of by the patient being a sensation of weight or a vague pain in the leg after walking.

In a more advanced degree the varix affects the shape of sacciform dilatations, which may be as large as a walnut or even larger. These varices are soft, fluctuating, and the skin covering them is thin. These large varices are more

frequently found on the trunk of the saphenous vein near the crural ring or below the internal condyle of the femur. A chronic œdema is often present in their neighborhood, which renders their dissection difficult.

A large varix seated near the crural ring has been mistaken for a hernia on account of the reduction of the tumor obtained by digital pressure, but this error is avoided if the leg be raised or if the femoral vein be compressed above the tumor.

A very large varix may pulsate, and give rise to bruit isochronous to the heart-beat, but this bruit and the pulsations do not belong to the varix, but are propagated from the underlying arteries.

The diagnosis of deep-seated venous ectasis is far more difficult. Here we find the patient complaining of a tired feeling in the limb after a short walk. Cramps and neuralgic pains are frequent and are more especially felt in the calves of the legs. Perhaps we can explain these painful phenomena by the pressure produced by the dilated vessels on the neighboring nerves.

A gentleman of forty consulted the writer not long since for a very disagreeable tingling sensation in both legs, particularly in the calves. His family and personal history excluded gout, rheumatism, malaria, venereal disease, or nervous trouble. The patient was engaged in a large grain business which kept him constantly on his feet.

When he retired his legs would immediately feel better, and in the morning, unless he had taken an unusual amount of exercise on the previous day, they would give him no trouble until he had been about for a couple of hours.

When the patient was first seen this state of affairs had existed for over seven years. He had seen many physicians, most of whom had pronounced his case to be muscular rheumatism, while one or two told him that he was commencing a *tabes dorsalis*. A diagnosis of deep venous ectasis was made, and he was ordered elastic stockings to extend above the knee, and when last seen by the writer was quite comfortable, although not en-

tirely cured. It may be said that there was absolutely nothing to be noted as to the appearance of either legs; the skin was normal excepting a very slight dilatation of the subcutaneous veins at certain points, and their development symmetrical.

The progress and prognosis of venous ectasis are very different according to the case, and really greatly depend on the occupation and social condition of the patient. Consequently the worst cases are more frequently met with among the working class.

As has already been said, their development is slow, but after a time changes occur in the varix and surrounding tissues. As a slow circulation is most favorable for the formation of a thrombus, these often arise in varicose dilatations, especially in the pockets formed by the valves. Their changes are numerous.

In the more favorable cases the thrombus becomes organized, transforming little by little into hard connective tissue, and by thus completely obstructing the lumen of the vessel brings about a spontaneous cure of the affection. But the thrombus formation is not without danger, because if it should disintegrate it will give rise to emboli. A thrombus may become infected and give rise to abscess or pyæmia.

Another complication of great danger is venous hæmorrhage. It may take place from a slight wound from scratching or by spontaneous rupture from exertion. The skin being so thin, it gives way at the same time that the vessel wall ruptures. As these ruptures are without pain, the patient may not be aware of the large amount of blood that is escaping from the wound, and fatal cases have been reported.¹

It may also happen that the skin does not rupture at the time the vein opened, so that the blood becomes pent up in the subcutaneous cellular tissue, in which case the patient is seized with pain and a considerable tumefaction of the parts.²

The last and at the same time most frequent and impor-

tant complication of varices is varicose ulcer. The lower limb offers a particularly good position for the development of ulcers on account of difficulty of circulation. If to this circumstance we add a circulation which is hindered by the ectasis, an incomplete nutrition of the parts, we can readily understand why a slight, superficial erosion, contusion, or eczema are sufficient to provoke the formation of a varicose ulcer. For that matter these ulcers also arise spontaneously.

They extend in surface little by little as well as in depth, and an irregular wound with cleanly cut borders, with a bottom covered with sluggish granulations or none at all, secreting a fetid and bloody liquid, results. This wound may become infected and suppurate, and in some cases give rise to a general infection or to erysipelas. Hæmorrhages also occur. The ulceration may take on such dimensions that in some cases amputation has had to be performed.

It is only when these ulcers are of considerable size that the patient will come for treatment, for varicose veins do not generally give rise to much trouble, and many are the therapeutical measures that have been extolled for their cure. Without going further into the consideration of the treatments of varicose veins and ulcers, as none of them are really of any value, for the very simple reason that they only treat the ulcer without suppressing its cause, we will simply describe Trendelenburg's operation, which, as we shall endeavor to demonstrate, is the ideal method of treating these most unfortunate patients.

Trendelenburg's operation is certainly the greatest progress that has ever been made in the treatment of ectasis of the saphenous vein, and although every case operated on has not resulted in a complete and radical cure, we at least almost always have a very marked improvement, with rapid cicatrization of the ulcers.

While studying the conditions of blood-pressure in the veins, Trendelenburg based his theory on the fact that the greater number of varicose veins of the lower limb are in relation with a general dilatation of the saphenous vein, and that

on account of this dilatation insufficiency of the valves results. As the inferior vena cava and iliac veins are devoid of valves, it naturally results that the blood column which extends from the saphenous vein to the right heart is not divided into segments, and consequently presses with all its weight on the walls of the saphenous and its ramifications. This hypothesis might explain the œdema, vague pains, and ulceration so frequent in varicose veins.



FIG. 1.

In order to give weight to his hypothesis, Trendelenburg performed the following experiment: He emptied the varicose veins of the leg by elevation of the limb and then lowered the leg again, but exercising strong pressure over the trunk of the saphenous vein. He then remarked that the veins were refilled slowly by the return blood coming from the arteries, while at the instant compression of the vein was

stopped a blood wave came from above downward, instantly filling all the venous trunks, thus proving that there is a great central pressure acting on the walls of the veins, and from this reasoning Trendelenburg advised ligature of the saphenous vein at two points followed by section of the vessel between the ligatures.

The operation of ligaturing the external saphenous vein is very simple and requires no special instruments. The re-

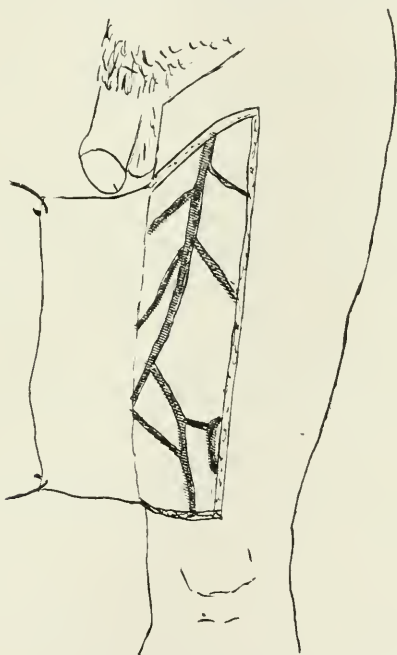


FIG. 2.

gion of the incision should be shaven and properly disinfected, and a rigorous asepsis must be maintained throughout, for infection of the vein, resulting in a suppurative phlebitis, with all its consequences, might otherwise occur, and it is for the same reason that union of the incision by first intention should be secured. We do not recommend the use of Es-march's band, although some surgeons advise its use.

To find the line of incision, the internal aspect of the

thigh should be carefully explored, and a bluish line will be seen, which indicates the course of the internal saphenous vein. The vessel will be very easily found if it presents an ectasis in this region.

Subjects in which the course of the vein is not readily seen may necessitate a slight constriction at the upper part of the thigh, so that the superficial veins will distend as the blood continues to be pushed through by the arteries.

An incision measuring from seven to ten centimetres should then be made, beginning slightly above the union of the lower with the middle third of the thigh. The vein is usually found without difficulty, although in stout persons it may take a little time to find it. The vein is then carefully freed by a blunt dissection so as not to injure the vessel. All branches going off from the saphenous vein are now ligated, and when this has been done a ligature is placed on the vein at the upper and one at the lower angle of the skin incision. That portion of the vein situated between the two ligatures is then excised with the scissors.

The cutaneous incision is then sutured and a large piece of xeroform or dermatol gauze placed over it, then over this a thick layer of cotton, this dressing being kept in place by a roller bandage. The use of a general anæsthetic is not necessary, although the writer prefers it, and cocaine may be employed.

After the operation the ectasis rapidly decreases, and if there be ulcerations they will soon cicatrize. It is quite evident that rest in bed is also a help for the cure, but it is certain that they heal more rapidly after this operation than by any other treatment combined with rest in bed. It is well to have an elastic stocking worn, for a few months at least, after the operation.

Tenacious varicose ulcers, which, as we all know too well, resist all treatment, certainly heal in a most astonishing manner after ligature of the vein.

The results reported by Trendelenburg, Tobold, Chate-lain, Faisst, Perthes, Cordebart, Schäffer, and others are cer-

tainly good in the majority of cases, and a permanent cure has resulted.

The writer has done this operation seven times, and here reports briefly his cases.

CASE I.—Mrs. J. H., aged thirty-seven years. Four children; the last being three years of age. Since birth of last child has suffered from a well-developed ectasis of left leg. No ulcers. Much pain and sensation of tension in leg. Heart and lungs normal. Urinalysis negative.

Operation March 12, 1896. Vein easily found. Union *per primam*. Result: Complete disappearance of ectasis within ten weeks after operation. Examined in October, 1897, and no relapse found.

CASE II.—Miss S. D., aged twenty-nine years; shop-girl. For past six years has been considerable of a sufferer from ectasis of veins of left leg. Great discomfort towards afternoon, after patient has been standing during the morning. Otherwise in very fair health.

Examination showed enlarged veins on inner aspect of leg, especially marked over internal condyle of tibia.

Operation on April 17, 1896. Result: Permanent cure when seen in October, 1897.

CASE III.—L. J., aged fifty-seven years, housewife; seven children. Well-nourished, healthy woman. Has suffered from ectasis of internal saphenous vein for over seven years. About seven months before consulting writer, an ulcer appeared about four centimetres above the internal malleolus, and had attained the size of a quarter of a dollar.

Operation September 20, 1896. Vein quickly found. Union *per primam*. Ulcer cicatrized at the end of five weeks and ectasis greatly diminished.

Seen in September, 1897. No return of ulcer; a few varicose veins still to be seen over calf of leg, although in no manner to be compared with the original condition. Patient states that her leg gives her no inconvenience.

CASE IV.—L. F., aged sixty-four years; washwoman. Large varicose veins of left leg with a large circular ulcer on internal aspect of leg, about seven centimetres above malleolus.

Operation November 12, 1896. Some difficulty in exposing

vein on account of abundant subcutaneous cellular tissue. When found, the vein was small and rather sclerous. Discharged in six weeks; ulcer healed; ectasis greatly diminished.

Seen in September, 1897. Leg in excellent condition. No return of ectasis or ulcer.

CASE V.—G. H., aged forty-six years; housewife. Has suffered from varix of both legs for several years. Trophic disturbances began to occur in right heel, causing much pain, especially towards evening, and obliged the patient to seek medical advice.

Examination showed a varicose condition of the veins of labia majora, but uterus and adnexa appeared to be normal. General condition good. Negative urinalysis.

Operation on January 8, 1897. Both saphenous veins were ligated in one *séance*. Recovery uneventful. Trophic disturbances over right heel ceased almost immediately after operation. Discharged in six weeks.

Seen in October, 1897. A slight ectasis on right leg; left leg normal.

CASES VI and VII have been operated on within the past four months, and consequently it would be premature to consider the result, which up to the present is good, as permanent. The last case, an old lady of sixty, presented an anomalous condition of saphenous vein of right leg. After incising at the point of election no vein could be found, it being replaced by a number of small branches. A second incision over the internal aspect of the condyle of the femur, however, exposed the internal saphenous, which was ligated at this point.

This anomalous condition of the internal saphenous vein is mentioned by Sappey, Cruveilhier, and other anatomists.

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¹ Eczema is of common occurrence in the region of a varix. It will appear sometimes without any material cause, while at others a traumatism will be the factor in its production. According to Broca, an eczema is nearly always present before the appearance of an ulcer, and is a frequent cause of the latter complication.

Syphilitic eruptions may also arise and complicate a varix. These are more particularly secondary or tertiary ecthyma and gumma, which remain sufficiently characteristic in appearance to make a diagnosis in the vast majority of cases. Verneuil particularly insisted on what he termed "hybridité syphilitico-variqueuse" of ulcers, and pointed out the part

played by antisyphilitic treatment in bringing to light the true nature of the affection.

²It may be well to here append a few words regarding *varicose phlebitis*. A varix of the first degree is not so liable to become inflamed as those of the second and third degrees, but serpiginous ectasis and varicose tumors are more readily subject to inflammatory processes. Pregnancy, constitutional conditions, and the infectious diseases are the predisposing causes.

Local causes, such as a local infection entering through an ulcerated or ruptured vein, are important factors, while overwork and privation only secondary ones. The infectious agent penetrates the tissues and is then carried through the vessels in the circulation.

Deep varicose veins may rupture from a sudden contraction of the muscles, a shock or a violent traumatism producing a fracture, and a phlebitis has been thus set up, which has in some cases ended in deep suppuration and pulmonary embolus.

Two forms of phlebitis are met with,—viz., diffused phlebitis and phlebitis of varicose nodules. The first variety is usually insidious in its beginning; there is a rapid fatigue in walking and œdema of the leg at the end of the day. Finally, there are all the usual symptoms, such as pain and changes of the skin along the track of the vein. The phlebitis may remain localized to a small portion of the vein or may invade the entire venous system of the limb, in which case embolus is to be feared.

A. Broca has given as special description of inflammation of the ampullæ, which may be attacked separately, although having undergone little previous pathological change. The diagnosis is a simple matter when there are only a few inflammatory nodes, but it becomes difficult when they have become fused into one phlegmonous mass, which may be mistaken for a syphilitic gumma or an erythema nodosum.

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A METHOD FOR PARTIAL RESECTION OF THE EYEBALL AND OF THE OPTIC NERVE.

By ERNEST HALL, M.D.,

OF VICTORIA, B. C.

IN dealing with the surgery of the face, head, or other exposed parts, we have, in addition to ordinary principles, to consider that of preservation of feature. Especially should we keep this in mind when dealing with so important a factor as the eye, and nowhere, perhaps, has this been neglected to such an extent as in the usual method of treatment of septic, sightless, and disfigured eyeballs. From Mule's glass spheres to the different methods of anterior muscular union, no method has yet given at once the *desideratum*,—viz., that of immunity from local and sympathetic inflammation, with satisfactory movement of the artificial eye.

It is difficult to imagine any result of ophthalmic art more offensive to refined taste than that of a comparatively motionless, artificial eye, a result so often found after the ordinary enucleation. Surely our unfortunate patients deserve a more careful consideration in this regard than many of them receive. He who but follows old methods should be sufficiently just to refrain (except under most exceptional circumstances) from thus disfiguring his patients.

For two years I have been following a method which, in all but malignant cases, appears to fulfil all requirements, both surgical and cosmetic, and which has given such satisfaction that I consider it worthy of more extensive trial. The strategic parts of the eyeball are the ciliary region in front and the sclero-optic junction behind. The principal traumatism and sepsis which leads to loss of function is in the former location, and the conveyance of trouble, sympathetic or

septic, to the other eye is through the latter. With these parts, the retina and vitreus, removed, the remaining parts of the eyeball should be non-irritating and harmless. If so, surgery says preserve them, and if they can conserve a purpose by all means let us retain them. The intervening sclerotic zone, with all its muscles attached and motor nerves undisturbed, can be made the movable pad upon which the artificial eye may be placed, and thus secure the greatest possible rotation.

The instruments required are speculum, sharp-pointed scissors, catch-forceps, and curette. The eye is thoroughly cleansed, if possible, for a few days previous to the operation,

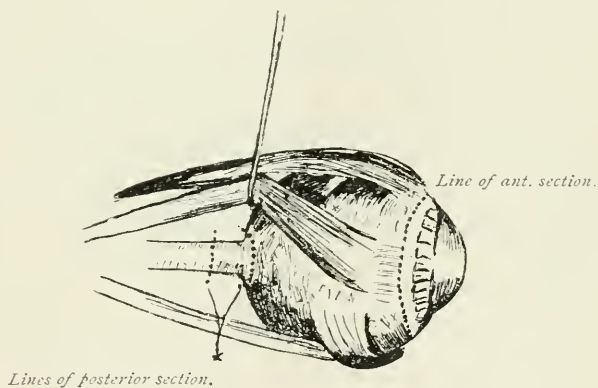


FIG. 1.—Showing parts of nerve and sclera to be removed.

as it is always desirable, though not absolutely necessary, to have an aseptic field.

Complete Anæsthesia.—With speculum in place, the scissors are inserted about twenty-five millimetres behind the sclerocorneal junction, sufficient to include the ciliary body, and complete section made, thus removing the whole front of the eyeball. (Fig. 1.) The vitreus is then evacuated and retina removed by curette; the hæmorrhage here is usually profuse, but easily controlled by hot water and pressure. The speculum is then inserted within the ball, and thus made to hold both eyelids and edges of sclerotic opening. (Fig. 2.) The point of entrance of the optic nerve is then grasped with

tooth-forceps and the scissors inserted as close to nerve as possible, to avoid wounding the ciliary arteries, and a circular incision made in sclerotic, freeing the optic nerve, which is then drawn forward and severed about twenty-five millimetres from sclerotic junction, thus removing a section of the optic nerve. A laryngeal head-mirror is useful here to concentrate the light within the sclerotic cavity. A piece of gauze is inserted and the sclerotic and conjunctiva closed vertically in order to give normal tension to internal and external recti; as lateral motion is of greater importance than vertical. The after-treatment is simple, the gauze may be removed in twenty-four hours. The cavity fills with blood,

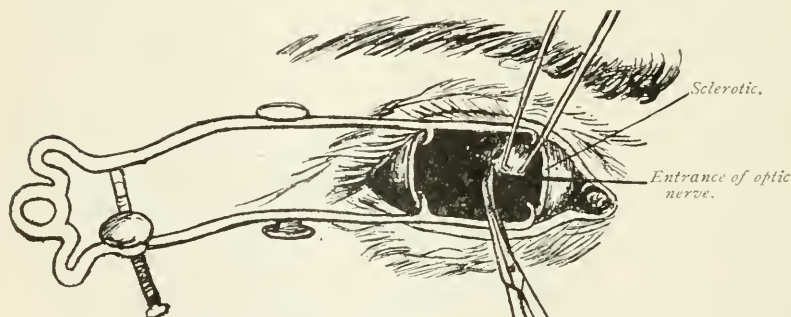


FIG. 2.—Speculum inserted within the sclerotic, showing method of removal of sclero-optic junction.

which becomes partly organized, thus preventing complete collapse of the sclerotic. An artificial eye may be inserted within two weeks.

As to Results.—A fuller pad, giving greater prominence to the artificial eye. Since Tenon's capsule, the muscles, and the nerves are not interfered with, the pad has a wide range of movement, giving the artificial eye perfect movement within thirty-five degrees lateral and twenty degrees vertical, but beyond that somewhat limited motion; diagonal motion is also retained. The lachrymal gland, ducts, and nerves not being disturbed, the eye is bathed in the normal secretion, thus avoiding the dry glazed appearance so frequently presented by the artificial eye.

CASE OF HYDRONEPHROSIS FROM STONE IMPACTED IN THE URETER OF A CHILD.

By JOHN W. PERKINS, M.D.,

OF KANSAS CITY, MO.

MOLLIE M., aged ten years, was first seen by me January 24, 1895. She had never had any previous sickness or colic of any kind. At supper time of the preceding day, in going past a chair, she struck her right loin against it, and immediately cried out that her side pained her. She was soon relieved and the incident forgotten, until two and a half hours later, when the pain suddenly returned and she was soon in great agony. She passed a sleepless night, vomiting and suffering severely until daybreak, when she was seen by Dr. B. H. Zwart, of Kansas City, who gave her morphine enough to relieve her pain. I saw her with him at 2 P.M. of the same day.

She was a well-developed, intelligent girl, of healthy parentage. The pain was intermitting and spasmodic in character, and severe. Pulse 60, heavy and markedly irregular; temperature 100.5° F. Her abdomen was tense, and very tender over the right side, so much so as to preclude careful examination. An ill-defined mass, however, could be made out in the right loin. Her tongue was dry, her countenance anxious, and at times she complained bitterly of the pain, even when stupid from morphine. She had passed a little urine, but had no unusual frequency or desire. The urine was normal. A diagnosis of renal colic had been made by Dr. Zwart, and, as this was probable, it seemed wise to await developments. The opiates were continued as needed. In view of her surroundings and the possibility of operative interference, she was at once taken to St. Margaret's Hospital, two miles from home. She did not suffer from the trip, and was fairly comfortable under the opiates until shortly after 7 P.M., when the pain became more severe. I saw her again at 8 P.M. with Dr. Zwart. Her general condition had changed materially. Her face was white and anxious, her extremities cold; she seemed

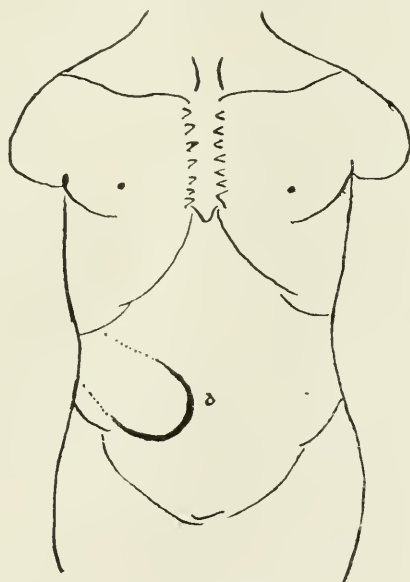
prostrated, collapsed. Her pulse had risen to 120, temperature 102°. Vomiting was severe, the tumor in the side seemed much larger and was exquisitely tender. The whole abdomen was somewhat distended. We both were now doubtful as to the correctness of the diagnosis, although it proved to be good. Operation was advised and immediately performed. Ether by Dr. T. L. Bennett, Dr. Zwart assisting. After etherization a more careful examination of the tumor was made. It was firm and very tense, its internal border round and full. It occupied the region shown in the diagram, extending two inches below the umbilicus. The anterior abdominal wall was distinctly bulging as she lay on her back upon the table.

An exploratory incision one and a half inches long was made over the most prominent portion, in the right semilunar line, the middle of the incision being opposite the umbilicus. Through this opening the rounded tumor presented, evidently behind the colon, very tense and thin-walled, continuous apparently with the kidney above, and enlarged below so that the largest diameter was just below the level of the umbilicus. The ureter was found much dilated, and traced to the point where it passes over the pelvic brim. Here a stone was felt. An attempt was made to push this down into the bladder, but without success. It was then easily pushed back into the kidney, and the very tense tumor began to collapse at once. The wound was closed temporarily, and a second opening made in the lumbar region over the kidney. The upper half of the kidney appeared to be normal, while the lower portion was expanded into a large, thin, white-walled cyst, in which most of the urine had evidently been contained. This was now lax and flabby to touch. I thought best to open into the pelvis through the sound kidney substance well above the edge of the cyst, and not through the cyst wall, fearing that the opening here might be slow in healing, and perhaps lead to a permanent fistula. About a pint of urine escaped from the opening. The large sac admitted the finger readily into the cavity in every direction. The stone was quickly found in the pelvis and extracted. It was cylindrical in shape, three-quarters of an inch long, and of the diameter of a lead-pencil. Its color was brown, its surface very smooth. No other stones were found. The operation lasted forty minutes.

The wound in the back of the kidney bled very little (proba-

bly on account of the pressure to which it had been subjected) and was immediately closed. The method used was one which I have never seen described, but which I have found successful in obtaining primary union. The perinephritic fat was dissected up with the finger on either side of the kidney opening, and a thick tampon of gauze inserted on either side, so as to compress the opening laterally. A third tampon was then tamped firmly between these, and against the site of the incision the ends of all three being brought out through the opening in the loin.

The patient recovered quickly from the operation. There



Perkins's case of hydronephrosis in ureter of a child.

was but one spell of vomiting, and that short. She passed a large quantity of urine at the first micturition. At the end of the first twenty-four hours less than a teaspoonful of yellow fluid had seeped into the dressing. The outside gauze was repeatedly changed, but there was no further discharge. At the end of four days chloroform was given, the tampons removed, and the wound flushed with 4-per-cent. carbolic solution and peroxide of hydrogen. The kidney wound appeared united and was disturbed as little as possible. The opening in the loin was then sewed in two layers with silkworm gut, a small pencil of gauze being left

in the lower angle in case of leak. The wound united by immediate union, and she left the hospital on the tenth day with the wound completely healed. At the time of writing, three years later, she remains well. No evidence of the cyst can be obtained on palpation.

The mechanism of the accident was apparently as follows: The stone dislodged by the blow in the side followed the gush of urine into the ureter, where it lay for two and a half hours till urine enough accumulated to drive it forward to the pelvic brim. Here it stopped, as from its shape it was difficult to round the curve. The *vis a tergo*, the urine, evidently found less resistance in dilating the cyst than in driving the stone forward. Hence the rapid increase in the size of the tumor, and the sudden accession of severe symptoms. It is probable that the solitary cyst was congenital, and the calculus was contained therein. It would seem hardly possible that a cyst replacing the whole lower half of the kidney could have been a retention cyst due to the calculus. The stone had no resemblance to ordinary kidney stones, being cylindrical in shape, and evidently not moulded in either pelvis or calyces. The cyst communicated freely with the pelvis of the kidney, its walls being apparently continuous, as far as could be judged by the finger. And on the back of the kidney, the capsule, and kidney substance were plainly seen to merge into the cyst wall. The fluid which escaped when the kidney was opened was apparently unmixed urine and did not coagulate.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, December 22, 1897.

The President, ANDREW J. McCOSH, M.D., in the Chair.

SUBPHRENIC ABSCESS AND PYOPNEUMOTHORAX, WITH DOUBLE PNEUMONIA.

DR. A. G. GERSTER presented a woman, who, at the time of her admission to the hospital, was in such a desperate condition that very slight hopes of benefiting her were entertained. No satisfactory account of her previous history was obtainable. She had a pyopneumothorax, which was undoubtedly caused by a perforation of a subphrenic abscess, which again was complicated by a perforation into a bronchus. At the time of her admission she was deeply cyanosed and septic.

After incising and draining the subphrenic abscess and the pus-cavity in the chest, the woman developed a double pneumonia, which was so severe that for about eight days her life was despaired of. During this period she was deeply cyanosed and gasping for breath. She finally recovered, however, and at the present time the abscess cavities have healed, her septic symptoms have disappeared, and the woman has a very fair chance to enjoy life and health for many years to come.

The operation in the above case was performed by Dr. Van Arsdale in Dr. Gerster's service. The patient was presented in order to illustrate what may be done in a class of extreme cases where no surgeon would have cared to interfere fifteen or twenty years ago.

A CASE OF SUBPHRENIC LIVER ABSCESS; TRANS- PLEURAL DRAINAGE; PYÆMIA; RECOVERY.

DR. GERSTER also presented a man who was admitted to the hospital on June 28, 1897, for subphrenic liver abscess, situated

underneath the dome of the diaphragm. In order to gain access to this abscess the following operation was resorted to: The right pleural cavity was opened by excising the eighth and ninth ribs. The pleural sac being protected by suitable packings, the dome of the diaphragm was then opened, and a tremendous amount of pus evacuated. After due toilette of the field the diaphragm was sewn to the parietal pleura, and an incision made in the pleural cavity higher up to guard against the possibility of retention due to the possible infection of that cavity.

The patient was so weak that it was thought he would die on the table. After the operation he improved, however, and the discharge from the subphrenic abscess gradually diminished. About the middle of July he developed a number of abscesses on the scalp and buttocks, which were incised. On August 10 he began to complain of very severe headaches, and on the following day he had an epileptic attack, which lasted for five minutes. Other cerebral symptoms followed, and on August 20 Dr. Van Arsdale performed craniotomy and searched ineffectually for a brain abscess. On the 30th of August it was ascertained that a large portion of the parietal bone was necrosed, and underneath it an extradural abscess was found. The abscess was drained and the sequestra removed, and the patient's cerebral symptoms gradually disappeared.

On September 2 his left knee became swollen and painful, and a week later the purulent effusion it contained was evacuated by incision and drainage. The right knee also became affected, but it improved spontaneously. On October 4 another incision into a periarticular abscess near the left knee became necessary. From that date the patient began to improve, and on November 21, 1897, he was discharged cured.

Dr. Gerster said that in a number of respects this case was a remarkable one. For a long time the patient was a mere skeleton, and it was hardly considered possible that he could recover. During the course of his pyæmia a number of injections of anti-streptococcus serum were given, with doubtful benefit.

DR. WILLY MEYER said that in a case of abscess of the liver, coming under his observation about two years ago, he had resorted to an operation similar to the one described by Dr. Gerster. In that case he intentionally entered the pleural cavity after resection of the eighth rib. The speaker said that by

making a long external incision and arranging the layers of the wound funnel-shaped one can nicely gain access to the deeper structures. After incision of the costal pleura compression by an assistant's finger prevented the entrance of air. A continuous catgut suture then united the borders of the costal pleura with the diaphragmatic pleura. Afterwards the diaphragm was incised and the abscess successfully drained. The patient made an uneventful recovery.

SARCOMA OF RETAINED TESTICLE, WITH TWISTED PEDICLE.

DR. GERSTER presented a man, twenty-one years old, who, when he came to the hospital, stated that he had been well up to the day previous to the time of his admission. On that day he had suddenly felt a pain in the right iliac fossa, where a swelling developed. He vomited frequently and had an elevated temperature. On examination, a globular mass, about the size of the head of a new-born child, was found in the right iliac fossa. The mass was very sensitive to the touch.

The examination also revealed that the man had a hypospadias of the third degree. There was no erectile body of the urethra, nor a penile urethra, and the urethral opening was situated far back, in the middle of the scrotum. When an erection occurs, a downward curvature of the penis takes place. The testicles had never descended. Nothing abnormal was found in the urine. The diagnosis of a morbid disorder of the undescended testis was made.

As the man's pulse-rate and fever became high, and vomiting persistent, it was decided to operate. The abdomen was opened and the mass removed. It proved to be the right testis, which was the seat of sarcomatous degeneration and, in addition, had become twisted on its pedicle.

In reply to a question, Dr. Gerster said that the opposite testicle appeared to be normal in size and shape, and bore some resemblance to an ovary. It was found inside the abdominal cavity. The diseased testicle showed a distinctly fimbriated margin. The presence or absence of a prostate could not be ascertained.

RESECTION OF SMALL INTESTINE FOR GANGRENE,
FIFTEEN HOURS AFTER STRANGULATION.

DR. WILLY MEYER presented a man, twenty-nine years old, who, without previous history of hernia, on September 30, 1897, after having been obliged to lift a very heavy barrel, that evening felt some pain in the left inguinal region. This pain persisted and gradually increased in severity, and on October 4 a physician was summoned, and found evidence of an irreducible hernia. The patient was placed under an anæsthetic, and an unsuccessful attempt to reduce the hernia was made. After the anæsthesia, patient vomited a great deal and symptoms of strangulation set in. Fifteen hours later Dr. Meyer operated. He found the hernial sac filled with a black-blue coil of intestine and a large amount of fluid. As no improvement occurred in the color of the strangulated gut after freeing it, about six or seven inches were resected, and the divided ends brought together by means of a Murphy button. Bassini's operation was added. The patient's recovery was uneventful.

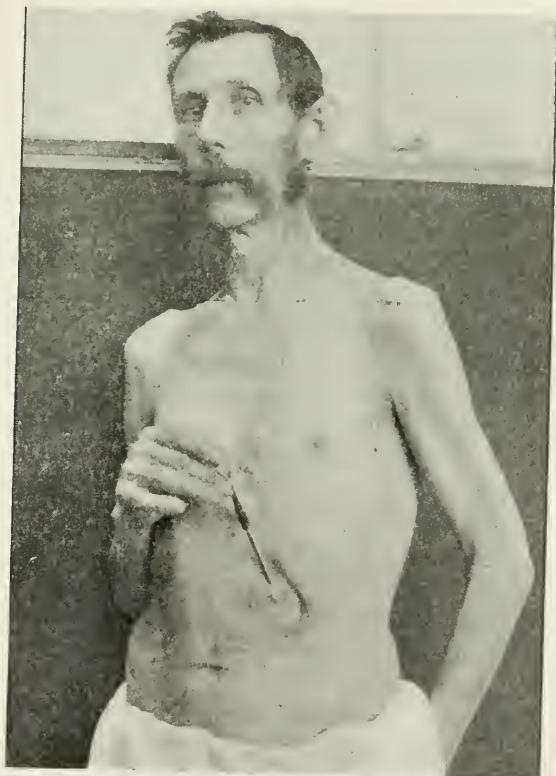
An examination of the excised portion of the intestine showed almost complete gangrene of the mucous membrane.

DR. STIMSON said that at the previous meeting of the society he had reported a case of intestinal anastomosis by means of a potato button. On the ninth day after the operation the button was passed *per anum*, slightly reduced in size, but otherwise unchanged.

GASTROSTOMY BY MARWEDEL'S METHOD.

DR. WILLY MEYER presented a man, sixty-three years old, upon whom Dr. Meyer had performed gastrostomy for cancerous obstruction of the œsophagus. The operation done was that of Marwedel, which was described in the *Beiträge zur klinischen Chirurgie*, 1896. Briefly, the steps of the operation are as follows: After opening the peritoneal cavity by Fenger's oblique incision and stitching the parietal peritoneum to the skin, a fold of the anterior wall of the stomach is drawn out, and in the usual manner is sewn into the abdominal wound with continuous catgut sutures. The wall of the stomach is now split in a longitudinal direction for a distance of about five centimetres, the incision being made through the serous and muscular coats down to the

mucosa; these are then dissected loose from the mucosa on each side, and at the lower angle of the wound an opening is made into the stomach, through which a small rubber tube is introduced and fastened to the mucous membrane with a catgut suture. The serous and muscular coats are then again stitched together over the tube by means of interrupted or continuous suture. The tube thus runs between muscular and mucous layer of the gastric wall.



Silver tube introduced by patient into the gastric fistula for feeding.

The advantage of this operation, which Dr. Meyer said he had thus far performed three times, is that it is not necessary for the patient to wear the tube continuously, as it can be reintroduced by the patient himself with comparative ease. Furthermore, there is no danger that the gastric fistula will close, and it gives rise to no leakage whatever. The canal leading into the stomach

is amenable to stretching. Dr. Meyer has been able to pass a No. 30 French steel sound. The patient is provided with a female silver catheter, No. 15 French, one with two large side-holes and another one with end-hole and eye at the side. Either of them he introduces with ease in order to feed himself. After this procedure he withdraws the tube at once. The fistula closes absolutely water-tight. In the mean time he wears a piece of gauze with some ointment on the small opening. The latter is situated within a large flat scar—the cicatrized anterior wall of the stomach—and can be easily seen and reached by the patient. (See figure.)

DR. ROBERT ABBE said that any improvement in gastrotomy should be in the direction of its simplification. The speaker said that twice during the past summer he had done the operation under cocaine, simply making a median incision, which he preferred to the lateral one, and completing the operation after the method described by Senn. This operation can be completed in about twenty minutes, there is no granulating surface left, and the patient is fed before he leaves the table. The catheter, which is left *in situ*, causes the patient no annoyance, and this method, the speaker thought, was cleaner and less distressing than where the tube must be constantly reintroduced and carried about.

In cases where gastrotomy is required there is usually cancerous disease of the œsophagus, and the patients are brought to the table in a more or less exhausted condition. In many instances a septic pneumonia follows the operation, which is possibly due to the fact that the saliva which is secreted by the patient during the etherization enters the trachea, as it cannot get down the œsophagus. This explanation has been given by Dr. Lilienthal, and the speaker thought it a very rational one. The danger of a septic pneumonia is obviated if cocaine is used, and it also saves the one or two days of difficult feeding after the use of a general anæsthetic.

DR. MEYER said that with the method referred to by Dr. Abbe, the opening into the stomach may close rather rapidly, and if the tube happens to slip out, and surgical help not be near, it may be a difficult matter to get it back. By the Marwedel method the opening will remain patent, and the patient can remove and insert the tube at will. It should be the aim, when

establishing a gastric fistula for obstruction of the œsophagus, to make the patient *independent* from wearing a tube permanently.

Dr. Meyer said he had performed gastrostomy three times under cocaine, which he prefers if the patient's condition is very low. The occurrence of a septic pneumonia, in cases where a general anæsthetic is employed, is probably the result of aspiration of the secretions from the bronchi rather than from the œsophagus.

EXHIBITION OF RADIOGRAPHS.

DR. L. A. STIMSON exhibited a large number of radiographs, showing fractures of the elbow, forearm, wrist, and ankle, taken at the Hudson Street Hospital. Those of the elbow, taken in connection with photographs and specimens presented, show that the "gunstock" deformity is caused by angular displacement inward of the lower fragment after supracondylar fracture, the displacement being probably due to pressure of the sling under the elbow.

The radiographs of Colles's fracture showed comminution of the lower fragment to be frequent at all ages, and the prominence of the ulna to be due to the ascent of the lower fragment of the radius and the carpus; also that dorsal displacement of the lower fragment of the radius is much less marked than the common "silver fork" deformity indicates; also that fracture by extreme dorsal flexion of the wrist must be very rare. Fracture of the styloid process of the ulna was found only in cases with marked displacement.

The radiographs of fracture at the ankle showed very plainly the differences between fractures by inversion and those by eversion or abduction of the foot, the latter giving the well-known lines of fracture of Pott's fracture, while in the former the external malleolus is broken low down and the internal malleolus so high up that it brings away a considerable adjoining piece of the tibia.

Stated Meeting, January 12, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

A CASE OF DISLOCATION OF THE THUMB REDUCED BY OPERATION.

DR. FRED. KAMMERER presented a boy, who on the 10th of last August had sustained a dislocation of the left thumb. The dislocation appeared to be the usual one backward upon the metacarpal bone, and of that variety known as complex.

Under ether narcosis prolonged and repeated attempts were made to reduce the dislocation, all the usual methods being tried without success. It was thereupon decided to resort to operation, and on the following day, under ether, an incision was made on the outer aspect of the thumb instead of the inner side, as is usually done. The thumb was slightly deflected to the outer side. The incision showed that hindrance to reduction was due to the position of the long flexor tendon of the thumb. It was necessary to incise somewhat the external lateral ligament before the long flexor tendon could be lifted over the head of the metacarpal bone and reduction effected. The anterior part of the capsule and the sesamoid bones had also slipped between the head of the metacarpal bone and the base of the first phalanx of the thumb, but the speaker said that they evidently offered no obstacle to reduction and easily left their abnormal situation as reduction was effected. The tendon was tightly stretched over the lateral aspect of the head of the metacarpus, and it required some force to lift it over the latter into its normal position. Simultaneously the reduction was effected. All this had convinced the speaker that in this instance, at least, the dislocated tendon was the cause for inability to reduce without a cutting operation.

DR. L. A. STIMSON thought the result of the operation was very satisfactory, as the boy has now recovered almost the complete use of his thumb.

As regards the hindrance to reduction in these cases, the speaker said he had always found it, at both thumb and index-finger, in the position taken by the torn anterior ligament; when dislocation takes place, this ligament tears away from the metacarpal bone and swings back past the head of the bone, above which its torn edge engages.

In operating for the relief of this condition of affairs, Dr. Stimson thought it was best to approach the joint from in front. To loosen the ligament from the groove behind the head of the metacarpal bone, it is sufficient to make only a slight nick at its centre, which so loosens it that the bone readily slips into place; possibly the operation could be done with a tenotome. He thought it possible that this condition had existed in Dr. Kammerer's case, and had been relieved by his division of the lateral ligament preliminary to the shifting of the tendon of the long flexor.

EXPLORATORY NEPHROTOMY.

DR. KAMMERER presented a man who had suffered from symptoms of a renal character for the past three or four years, but his severe illness began only about four weeks previous to the time when he came under the speaker's observation. He then had what seemed to be a severe attack of renal colic on the left side; his pain was very acute and radiated down to the testicle. Following this attack there was a history of bloody urine.

When the patient came under Dr. Kammerer's care he had had a number of attacks similar to the one described above, and his general health was very much impaired. A cystoscopic examination was made, with entirely negative results. Lumbar nephrotomy was thereupon performed, and on exposing the kidney it was found enveloped by a dense mass of fibrous tissue, from which it was freed with difficulty. In trying to shell it out quite a large rent was accidentally made in its posterior surface. After entirely freeing it from its adhesions, the kidney was freely incised and thoroughly explored for stone, but none was found. The only abnormality observed was that the organ was congested and considerably increased in size. The hæmorrhage, which was very free, was controlled by tamponing and pressure.

The patient made an uneventful recovery, and since the time of the operation he has been absolutely free from his renal symptoms. There is a slight hernial protrusion at the site of the incision.

Dr. Kammerer said that an interesting point in connection with this case was the hæmaturia accompanying and following the attacks of renal pain. In some instances these hæmorrhages from a healthy kidney have been distinctly vicarious; in others they must be ascribed to abnormal nerve influences. Many cases

are on record where, after simple incision and exploration of the kidney, these hæmorrhages, after lasting perhaps for years, have ceased entirely and never recurred. In most of these cases it is reported that the kidney was found to be entirely normal at the time of operation. He did not know how to account for the formation of the dense fibrous tissue surrounding the kidney in the case.

DR. CHARLES MCBURNEY said he had met with quite a number of cases like the one reported by Dr. Kammerer which he had never been able to satisfactorily explain. The explanation given that the renal colic and hæmorrhage in such cases are the result of a neurotic condition he did not regard as satisfactory: neurotic conditions generally do not behave in that manner. In one case coming under his observation, a young lady who was not at all neurotic, there were three distinct attacks of severe pain referred to the right kidney; on each of these occasions she happened to be under the eye of a different observer, and all three made a diagnosis of renal colic. There was an interval of five or six months between the attacks, and each was accompanied by severe hæmorrhage, which persisted for several days. Dr. McBurney said that when he saw this patient she was having her last attack; the hæmorrhage had then lasted ten days; the urine was the color of dark claret and the patient was very anæmic. The kidney was exposed, opened, and thoroughly explored, but he could neither feel nor see any cause whatever for the disturbance. The hæmorrhage had been so severe and prolonged and the patient was so very anæmic that it was thought best to tie the renal artery and remove the kidney. After its removal no lesion was found, so far as its gross appearance was concerned. It was then submitted to Dr. Delafield, who had on one occasion seen the patient, and he reported that he had found evidences of a hæmorrhagic pyelitis, which, however, he had failed to recognize with the naked eye.

Dr. McBurney said he had operated on several similar cases where the symptoms of pain and hæmorrhage were entirely relieved by an exploratory operation, which had revealed no cause for the severe renal disturbances. In none of his cases had he found any thickening of the capsule, like that described by Dr. Kammerer.

The speaker said that, perhaps, the symptoms in these cases

might be due to some interference with the circulation of the kidney, owing to an abnormal position of the organ or to bands of connective tissue which interfered with the return of the venous blood. Apparently the kidney is excessively sensitive to slight interferences with its circulation.

RETROPERITONEAL FIBROLIPOMA.

DR. A. G. GERSTER presented a woman, forty-seven years old, unmarried, who had been admitted to Mt. Sinai Hospital during the latter part of the summer of 1897 for a tumor which was located on the right thigh. She was operated on by Dr. Van Arsdale, who removed what proved to be a large fibrolipoma from the thigh. It was then observed that the growth continued upward in the shape of a narrow pedicle, which passed under Poupart's ligament, and was connected with a larger growth situated within the abdomen. The pedicle was followed up for a considerable distance, and then, as it was not considered wise to prolong the operation, the wound in the thigh was closed. The dissection had been extremely difficult, on account of the close relation of the growth to the crural vessels. Subsequent to the operation the woman complained of severe pain in the region of the corresponding knee, and there was a wide area of anæsthesia on the anterior surface of the thigh.

In October, 1897, when Dr. Gerster first saw the patient, he found a tumor, about six inches in diameter, occupying the abdominal cavity. It was elastic, immovable, and smooth. On its inner margin the pulsation of a large vessel could be felt. The woman complained of acute pain in the knee, which was probably due to the pressure of the growth on the crural nerve.

In November Dr. Gerster operated as follows: An incision was made similar to that resorted to for ligation of the common iliac artery; the peritoneum was exposed and incised, an aperture being made large enough to admit two fingers, in order to explore the relations of the growth; this showed, as had been suspected, that the bulk of the mass was situated in the retroperitoneal region. The incision in the peritoneum was thereupon closed and the peritoneum itself stripped off, just as is done in exposing the retroperitoneal tissues. This was accomplished without much difficulty. It became necessary to continue the original incision down to about the middle of the symphysis.

Accordingly, the abdominal muscles were divided and a number of large veins clamped and cut and the crural nerve was stripped off the growth and pushed aside. Considerable difficulty was experienced in shelling out the main body of the tumor. After separation of the mass from its posterior attachments the iliac vessels were exposed. The pedicle of the mass was then followed downward underneath Poupart's ligament until the field of the previous operation was reached. This necessitated a further extension of the incision downward on the thigh, dividing Poupart's ligament, and exposing all the large vessels. The deep femoral artery and the internal saphenous vein had to be divided.

The wound left after removal of the tumor and its pedicle was enormous. Its upper portion was united by deep silkworm-gut sutures including the abdominal muscles and the rest was packed. The patient reacted but slightly to the operation. The healing of the wound naturally extended over a long period, but it finally contracted and the patient is now able to go about. She still complains of some pain in the leg, but it is not so severe as formerly. It was probably due to the fact that the crural nerve was stretched over the largest circumference of the tumor.

The tumor was situated in the retroperitoneal region and was about the size of a ten-year-old child's head. The pathologist reported that it was a fibrolipoma.

GIGLI'S WIRE SAW.

DR. WILLY MEYER exhibited one of Gigli's wire saws, which he stated he had used to advantage in a variety of operations within the last months. It is made of steel wire, with a very fine set of teeth all around, so that it can be used in any direction. It cuts like a knife, and with it soft tissues can be divided as well as bone. The saw is made in three different sizes. Its use has simplified many operations. In amputation of the leg or forearm, for instance, the interosseous dissection of the soft parts can be dispensed with. After the formation of the flaps a circular incision is made down to the bone, and the latter together with the soft tissues between them are then divided with the wire saw. The muscles, etc., appear as if divided with a sharp razor. Obalinski and Keen made use of the saw when resecting the bone-flap in operations on the skull. (See also Braatz, *Centralblatt für Chirurgie*, 1898, Nos. 1 and 3.)

DR. B. FARQUHAR CURTIS said he had used Gigli's saws for several years, and found them very durable and useful. Among other operations, he had employed it in resections of joints and for division of the lower jaw, and recently on the skull, in making an osteoplastic flap, passing it under the bone through two trephine openings and cutting out, as suggested by Dr. Keen, of Philadelphia. He had also found it useful in the removal of plaster bandages.

APPENDICITIS DURING THE EIGHTH MONTH OF PREGNANCY: DERMOID CYST WITH A TWISTED PEDICLE.

DR. A. G. GERSTER showed a dermoid cyst which he had removed from a young woman during an attack of appendicitis at the end of the eighth month of pregnancy. The patient gave a history of having had four previous well-defined attacks of appendicitis, from which she had recovered without operative interference. Later she became pregnant, and towards the close of the eighth month of her pregnancy she was suddenly seized with a severe pain in the right iliac fossa, accompanied by vomiting and slight fever. On the third day of her attack the vomiting became continuous and her pulse went up to 120. The abdominal walls were extremely tense, and there was marked tenderness in the right iliac region, but no evidences of a tumor in that location could be made out on account of the presence of the large uterus.

As the symptoms continued to progress unfavorably, Dr. Gerster decided to perform an operation, at which Dr. Paul F. Mundé was asked to be present. The usual incision for appendicitis was made, excepting that it was made a little closer to the rim of the ileum. When the abdominal cavity was opened, a considerable quantity of bloody serum escaped, and the enlarged uterus, with its enormously distended vessels, became visible. When it was lifted away from the ileum, a blackish-blue mass came to view, and again a good deal of bloody serum escaped from the peritoneal cavity. The mass referred to was about the size of an adult fist, and proved to be a dermoid ovarian cyst, which was twisted around its pedicle three times. After removing this the appendix was exposed. It was found to be in a condition of acute inflammation, sharply twisted on itself, with its

lumen almost completely obliterated to about the middle, where a firm stricture was found. It was adherent to the caput coli, from which it had to be dissected loose. It was then removed. The abdominal walls were closed with extra care on account of the probability of labor setting in. First, a closely placed row of button sutures were passed through the entire thickness of the abdominal walls, but were left open for the time being. Then the single components of the abdominal wall were sutured separately with catgut. Finally, the button sutures were tightened and closed, thus making a very safe closure, fit to withstand the demands of labor.

Twelve hours after the operation labor-pains set in and the woman was normally delivered of a live child. At the time of report, just fourteen days after the operation, both mother and child are alive and well.

FRACTURE OF ANATOMICAL NECK OF HUMERUS, WITH LUXATION OF HEAD INTO AXILLA (SUBGLENOID).

DR. GERSTER reported the following case, with specimen: J. R., male; aged forty-seven years; German. Admitted to Mt. Sinai Hospital October 13, 1897. Four weeks previously, while alighting from a car, he was thrown violently to the pavement, his right arm being outstretched as he fell. At the time of his admission he was unable to use this arm, and suffered pain and tenderness in the corresponding shoulder. No mechanical treatment had been instituted.

Under chloroform, the following conditions were found: The right shoulder was much swollen, the ecchymosis extending along the upper border of the biceps. There was no marked shortening of the humerus. A hard, resistant, globular mass was felt in the axilla, reaching down to the outer border of the pectoralis major and transmitting a sense of crepitus on rotating the arm. The mass was slightly movable, following rotation of the arm, but it could not be displaced upward. The glenoid cavity was empty. Crepitus could be felt between the lower fragment and the glenoid fossa. After anæsthesia the patient had slight febrile reaction and vomited frequently.

Operation, October 15, 1897, under chloroform. An inci-

sion was made along the lower border of the pectoralis major, and carried inward for a distance of five inches from the border of the deltoid. On exposing the axilla the detached head of the humerus came into view, with the plexus of nerves and vessels tightly stretched over its lateral surface. The head, which had been completely separated from the humerus at the anatomical neck, was attached by its upper margin to the lower lip of the glenoid fossa by dense, fibrous adhesions. The articular surface of the head looked inward and downward; the fractured surface outward and upward.

In order to remove the separated head, the tendon of the pectoralis major was divided: the fragment was then delivered with bone hooks, the adhesions first being divided. A longitudinal incision was then made through the skin and deltoid muscle, joining the first incision and exposing the lower fragment of the humerus. Its fractured surface was rough, but granulating. Drainage-tubes were inserted and the wound closed with catgut. The hæmorrhage during the operation was moderate. After the operation the temperature rose to 101.8° F., but fell again during the night. The patient reacted poorly from the operation; the wound suppurated, and death ensued on the fifth day.

Stated Meeting, February 9, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

RESECTION OF TRANSVERSE COLON FOR CANCER; NO RECURRENCE AFTER THREE AND A HALF YEARS.

DR. HOWARD LILIENTHAL presented a case, which had already been shown on two previous occasions, the last time about two years ago. The patient was a man who, when he first came under observation, was fifty-one years of age. He had been sick for about a year, complaining of abdominal pain and emaciation. In the median line of the abdomen a tumor, about the size of a hen's egg, was made out. An operation was performed on June 8, 1891, and the tumor, which sprang from the trans-

verse colon and had produced almost complete stenosis of that organ, was removed; about six inches of the colon were excised, together with the omentum belonging to it, and a few enlarged glands. There were numerous enlarged glands left behind in the mesentery, as they could not be removed. The pathologist pronounced the growth an adenocarcinoma.

Dr. LILIENTHAL said that three and a half years had elapsed since the operation, and there were no signs of a recurrence, in spite of the fact already stated that numerous enlarged glands had been left behind. The speaker said it was possible that the enlargement of those glands was due to the inflammation about the stenosed gut.

Dr. B. FARQUHAR CURTIS said that in view of the slow progress of an intestinal carcinoma in some instances, it was possible that the disease was still located in some of the mesenteric glands, but had not advanced sufficiently to give rise to any disturbance of the general health. The most prominent symptoms of growths in this location are those due to obstruction rather than to the tumor itself or to secondary deposits. He did not think that the diagnosis was in doubt because no signs of recurrence were thus far apparent, and he anticipated that the patient would eventually succumb to the disease.

Dr. FRED. KAMMERER said he agreed with Dr. Curtis that in cases like the one shown by Dr. Lilienthal the malignant growth sometimes runs a very slow course. It was also possible, as Dr. Lilienthal suggested, that the enlarged glands which were left behind were of an inflammatory character and not carcinomatous, precisely for the reason that a recurrence had not occurred.

Dr. LILIENTHAL rejoined that he fully expected that there would eventually be a recurrence. The diagnosis of carcinoma was unequivocally made.

CYST OF NUHN'S OR BLANDIN'S GLANDS IN THE TONGUE.

Dr. B. FARQUHAR CURTIS presented a woman, twenty-five years old, who, four months ago, noticed a swelling at the tip of the tongue, on the left side. This disappeared spontaneously, but soon afterwards a similar cyst made its appearance on the under surface of the tongue, just to the right of the frænum.

The tumor was purplish in color and measured about one inch in its long diameter and half an inch transversely; it was elastic to the touch. It was aspirated with a needle of good calibre, but nothing evacuated. It was then incised under cocaine, and a mucous fluid, such as is usually found in ranulæ, was discharged. The incision was made through the full length of the cyst, and then its lining membrane was sewn to the mucous surface of the mouth with fine silk sutures. Primary union of the edges followed, and the result has been all that could be desired. By this method a large opening into the cyst cavity is made which shows little or no tendency to contract.

Dr. Curtis said that complete extirpation of ranula, which has been urged by some, is unnecessary, in his opinion, and he regarded the method described above as preferable. By means of it he has treated very large ranula successfully, and obtained permanent obliteration of the cysts. Another method that has been suggested is partial excision of the cyst wall and packing the cavity; but recurrence is very common after this operation.

The location of the cyst in this case, Dr. Curtis said, was very unusual. It probably had its origin in one of the Blandin-Nuhn glands, situated in the tip of the tongue. Föderl (*Archiv für klinische Chirurgie*, xlix, 531) reports the case of a dead-born child where a very large cyst was found originating from one of these glands, and states that he was only able to find three similar cases in literature.

In his case, Dr. Curtis said, the cyst on the left side of the tongue was still apparent, but it is so small that it does not give rise to annoyance.

SUPRAPUBIC LITHOTOMY; DOUBLE NEPHROTOMY FOR PYONEPHROSIS; NEPHRECTOMY.

DR. FRED. KAMMERER presented a man, twenty-five years old, who had come under his observation about a year ago with a history of vesical irritation of about ten years' duration. A diagnosis of vesical calculus had been made and was very easily confirmed. The stone weighing three and a half ounces was removed by suprapubic cystotomy and the bladder drained. The patient did well, with the exception of abundant secretion from the suprapubic opening, which at times consisted of pure pus.

This suggested a kidney complication, although the examination of the urine had been negative. About six weeks after cystotomy the opening in the bladder was enlarged, and with an electric light within the bladder it was easily demonstrated that upon pressure in the lumbar region large amounts of pus flowed out of both ureteral openings.

One week later double nephrotomy was performed. The cortex of the left kidney was found reduced to about the thickness of ordinary blotting-paper and the organ itself consisted of two sacs, one about the size of two adult fists, the other about the size of one fist: they were separated by a partition and were filled with pus. On the right side the kidney presented itself as a sac with walls ranging from one-quarter to one-half inch in thickness and filled with pus. Both kidneys were drained, and this effected a permanent cure within two months on the right side; on the left side, however, although the drainage was continued for a long time, and the partition between the two pus-sacs was excised, it finally became necessary to remove the kidney after a lapse of about six months.

Dr. Kammerer said that drainage in cases of pyonephrosis, more especially when the condition was due to stone in the kidney, has not proved very satisfactory in his hands. In quite a number of cases of this character, where he has resorted to drainage, removal of the kidney finally became necessary.

In connection with his case, Dr. Kammerer showed the calculus removed from the bladder, and also the remnants of the left kidney. The patient is now enjoying good health. The urine contains simply a few white blood-corpuscles.

DR. A. G. GERSTER said that the fact mentioned by Dr. Kammerer that his conservative efforts in cases of suppurating kidney due to stone were not followed by very satisfactory results, coinciding with the experience of all surgeons. In cases of renal stone, without infection, the results of operation are vastly better than in cases where suppuration is present as a complication. In the former group of cases the mortality of nephrotomy is from 4 to 5 per cent., while in the latter it is from 23 to 24 per cent. The same difference exists in the results of conservative efforts directed towards saving the organ. In almost all cases where infection has taken place, especially where

there are multiple calculi, efforts at drainage are unsuccessful and ultimately the kidney must be removed.

OBSCURE SHOULDER INJURY.

DR. JOSEPH D. BRYANT presented a girl, fifteen years old, who, three years ago, while swinging, had fallen, striking on her right shoulder. Following the accident she experienced some difficulty in moving her arm and there was slight pain, which persisted, and at the end of two years became so severe that she for the first time confided to her parents the fact that she had met with an injury. She was placed under the care of a physician, and the limb during the past year had been subjected to passive motion. The condition was regarded by some as a dislocation.

An examination at the present time shows that the right arm is about two inches shorter than the left. The forearms are of the same length. There is well-marked atrophy of the right deltoid muscle. Motion is considerably impaired; there is slight tenderness on deep pressure. A radiograph of the right shoulder seems to show that there is no evidence at this time of any epiphyseal cartilage or displacement of the head of the humerus, contrary to what one should expect in a child of fifteen. It can also be made out that the head of the humerus is misshapen, smaller than usual, and in the glenoid cavity.

Dr. Bryant said that his opinion of the case was that for some reason—probably as the result of her accident—the epiphyseal extremity of the right humerus had failed to add its share to the development of the length of the bone.

DR. W. W. VAN ARSDALE asked Dr. Bryant whether he thought injury of the circumflex nerve had anything to do with the girl's condition? This nerve supplies the deltoid and a part of the capsule of the shoulder-joint, and, as the latter has a direct influence on the growth of the arm, it was quite possible that there was some connection between the two in this case. The speaker said he had recently investigated this very subject, and the cases of that nature which he had seen bore a striking resemblance to the one shown by Dr. Bryant.

DR. ROBERT ABBE said the radiograph exhibited by Dr. Bryant appeared to show an empty glenoid fossa and a subcoracoid dislocation. The shortening was probably due to arrest of development as the result of the injury.

DR. PARKER SYMS said he agreed with Dr. Abbe that there was a dislocation. The glenoid fossa was empty and the head of the bone seemed to be dislocated inward. The shortening, he thought, was due to injury of the cartilage.

DR. BRYANT said he did not agree with the previous speakers, that the head of the bone was displaced, for the radiograph and other signs seemed to him to disprove the fact. The shortening he attributed to an atrophy in the length of the bone, which was probably the result of injury to the epiphyseal cartilage. He was unable to say whether injury of the circumflex nerve had anything to do with the present state of affairs; such an injury might be accountable for the atrophied condition of the deltoid muscle.

GUNSHOT WOUND OF THE ARM SEVERING BRACHIAL ARTERY.

DR. W. W. VAN ARSDALE presented a man, thirty-five years old, who had been admitted to Mt. Sinai Hospital on the 22d of last July for a gunshot wound of the arm, severing the brachial artery. The injury had been received on the day previous, his gun having been accidentally discharged while he was jumping out of a boat on the coast of Long Island. The wound was a very extensive one, a large portion of the right biceps muscle being carried away, and severing the brachial artery and a number of large veins. A medical man, who was present at the time of the injury, immediately applied a tourniquet, and the patient was then taken to the nearest place for assistance, five miles distant, and the brachial artery was tied. The following day the patient was sent to Mt. Sinai Hospital. The injured arm was entirely bloodless and no pulse could be felt. Under anæsthesia it was found that the ligature had been applied just beyond the point where the profunda artery leaves the brachial, and instead of amputating, as was contemplated, it was decided to make an effort to save the arm, particularly as its loss would prevent the man from continuing his work as an artist.

In order to cover the extensive raw surface left by the wound, many skin-grafts were necessary, and it was four months before the man could be discharged from the hospital. The circulation of the injured member, which was at first rather

limited, in time was completely restored. But the skin and the most superficial muscles on the inner side of the forearm necrosed and sloughed off. Sensation has also been largely restored, that in the radial region being entirely normal, while that supplied by the ulnar nerve only shows slight impairment. He is able to pronate and supinate the arm, but he is unable to flex the fingers at the distal and second phalangeal joints; he can, however, flex them at the metacarpo-phalangeal joints. The thenar and hypo-thenar eminences have entirely vanished, and there is no reaction to the electric current, either galvanic or faradic, either in the hand or on the volar aspect of the forearm.

OPERATIONS WITHOUT ETHER OR CHLOROFORM NARCOSIS. GENERAL OBSERVATIONS AND REPORT OF ILLUSTRATIVE CASES.

DR. HOWARD LILIENTHAL read a paper with the above title, for which see page 581.

DR. ROBERT ABBE said that when eucaine was first put on the market he experimented with it on himself and came to the conclusion that as a local anæsthetic it was inferior to cocaine. The latter drug he has employed in many operations, including numerous cases of laparotomy and two of gastrostomy. Colotomy is very easily done under cocaine; also castration and the minor amputations, including amputation of the scrotum. Local anæsthesia, however, should not be relied upon in any case where a very extensive dissection becomes necessary,—perhaps more extensive than was originally expected; in such a case the procedure becomes a vivisection, the unfortunate patient suffering more than is necessary and the surgeon is handicapped in his work.

DR. A. G. GERSTER said he fully agreed with Dr. Lilienthal that in enfeebled subjects and in that class of operations where every step is well known, and which do not take up too much time, local anæsthesia is preferable to general narcosis. The speaker said that on a number of occasions he has done colotomy under cocaine anæsthesia, causing the patient little if any pain, and avoiding the disagreeable after-effects of ether or chloroform. Of course, as Dr. Abbe said, local anæsthesia has its limitations. Where careful dissection is necessary, where we are uncertain as

to the extent of the operation, or where we have to deal with a very nervous individual, local anæsthesia is not only insufficient, but is very unsatisfactory, both to the patient and the operator. Such operations, for example, as amputation of the breast or thigh under cocaine ought to be condemned.

Under certain circumstances, nitrous oxide gas is a very satisfactory anæsthetic, but it requires rather a complicated apparatus for its proper administration. In the case mentioned by Dr. Lilienthal, where amputation of both thighs was done under laughing gas (the first by Dr. Lilienthal; the second subsequently by Dr. Gerster), the patient appeared to be conscious during the entire course of the operation, but when it was completed she knew nothing whatever about it and claimed that she had felt no pain. The disagreeable after-effects of ether or chloroform were entirely absent, the patient feeling bright and at once taking food.

DR. PARKER SYMS said that in operations where careful dissection is necessary nitrous oxide was sometimes undesirable, because the dark color of the blood materially obscures the field of operation. It is extremely useful, however, in minor operations, and in most operations about the rectum, and in plastic operations on the female genitals. Its after-effects are certainly trifling as compared with those of ether and chloroform. Among the objections to it may be mentioned the increased expense, and the elaborate apparatus required for its administration.

As regards local anæsthetics, Dr. Syms said that he had found the freezing mixtures unsatisfactory, excepting in cases where a simple incision is all that is necessary. In one case of strangulated hernia, where the patient was in an enfeebled condition, the speaker had employed a 4-per-cent. solution of cocaine for the skin incision, and after that had used ethyl chloride in the wound, and although the operation was prolonged for about an hour, the patient said that she had felt absolutely no pain.

In parts of the body where the circulation can be shut off by means of a tourniquet, cocaine anæsthesia can be used with perfect satisfaction.

The speaker called attention to the danger of infection if hypodermic injections are made in a region which is the seat of acute or inflammatory trouble. In such cases the injection

should be limited to the line through which the incision will be made.

In conclusion, Dr. Syms called attention to the necessity of having a hypodermic syringe which can be properly sterilized, and this can only be accomplished by boiling. From this point of view the most satisfactory syringe known to him is the one recognized as the Dennis hypodermic syringe.

DR. KAMMERER said he had formerly employed cocaine for local anæsthesia, and afterwards a mixture of cocaine and eucaine, half of each, in a 1-per-cent. solution. Where there is no inflammation he has employed Schleich's infiltration mixtures with very satisfactory results. The weaker solution (No. 2) can be injected in large quantities, and the speaker thought it was the best local anæsthetic we have.

DR. JOSEPH D. BRYANT said that in two instances coming under his observation the patient could not be controlled by the influence of nitrous oxide gas sufficiently to prevent free and periodic movements of the limb under operation. This might be regarded as a contraindication to its use in operations of a delicate nature.

DR. LILIENTHAL, in closing, said he was aware that eucaine is not as powerful as cocaine, but the strength of the solution can be fixed accordingly. The anæsthesia it produces seems to come on slower than that caused by cocaine, but it is quite as profound and lasts very much longer. Its first introduction into the skin is more painful than cocaine. A mixture of the two, he thought, was of value, and would perhaps eventually prove to be the ideal local anæsthetic: eucaine stimulates the vagus and slows the heart, while cocaine does just the opposite. In a case where local anæsthesia proves inadequate, chloroform can be used after eucaine with much greater satisfaction than after cocaine.

One caution to bear in mind when nitrous oxide gas is employed is to be sure that enough is used. The speaker said he had employed Schleich's mixtures in a few cases, but the artificial cedema which it produced was disagreeable.

As regards the choice of a syringe, Dr. Lilienthal said he preferred the Lürer syringe, which is made entirely of glass, with an irido-platinum needle.

TREPHINING AND HETEROPLASTY FOR TRAUMATIC EPILEPSY.

DR. A. J. McCOSH presented a young man, seventeen years old, who in 1892 received a small, depressed fracture of the skull in the left frontal region, which caused some temporary paralysis of the right arm and leg. The depressed portion of the bone, which was about one inch in diameter, was removed, and the patient remained perfectly well for eighteen months, when he began to have convulsions, which gradually increased in frequency until he was having two or three per month. The convulsions were general in character, and at their onset the head always turned to the right. About two years ago the patient was again operated on, the original wound, which was located in the left frontal region, over the eye, being reopened, and a layer of rubber tissue inserted. Subsequent to this the patient remained perfectly well for twenty months when (November, 1897) he began to feel and act in a peculiar manner, and in January, 1898, he had a series of convulsions, each lasting about five minutes; these recurred every half hour for a period of forty-eight hours. When he was admitted to the Presbyterian Hospital, on February 2, his temperature was 104° F.; pulse 130 per minute. On the first day after his admission he had a convulsion almost hourly; later, under the influence of bromide and strychnine he became quieter and the convulsions decreased in frequency. Between February 4 and 8 he had only one convulsion daily. There was no paralysis.

On February 8 Dr. McCosh made an incision over the old trephine opening, and found a circular opening in the skull about an inch and a half in diameter, which was filled by dense connective tissue. A layer of this, about one-eighth of an inch in thickness, was removed, and below it was found a mass of the same firm cicatricial tissue, in the centre of which there was a nest of softer tissue with the appearance of old granulation tissue, in the midst of which were seen blackish particles which, on careful examination, proved to be fragments of rubber. They were very minute in size and were amalgamated with the connective tissue into this nest-like mass, which was about the size of a small cherry. It was removed, together with the cicatricial tissue surrounding it, representing altogether a tumor the size of a small

walnut. Its removal left a cavity in the third frontal convolution about one and a half inches long, one inch broad, and one and a half inches in depth.

DR. ROBERT ABBE said that he had operated on this patient about two years ago and put in the rubber tissue which Dr. McCosh had found. A few weeks after it was inserted a sinus formed and the wound had to be reopened. The sinus afterwards closed and the patient was lost sight of.

Dr. Abbe said that in three other cases of brain injury he had resorted to this expedient, and this is the first case he knew of where the rubber tissue had given rise to any trouble. It was laid upon cerebral tissue of the frontal lobe where a dense scar had been dissected from it, and the only covering for it was the old cutaneous cicatrix. It was hoped that as in other cases the interposition of a smooth surface would beget a thin superficial cerebral cicatrix less provocative of convulsions than the old scar, and for more than two years this had prevailed. Dr. Abbe was not surprised that development of granulations about the rubber had ultimately broken it up and enveloped it. It simply showed nature's effort to expel it when suppuration had once started. No argument could be based on this case as to the behavior of tissue in non-suppurative cases.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 6, 1897.

The President, W. W. KEEN, M.D., in the Chair.

TEMPORO-MAXILLARY ANKYLOSIS.

DR. J. EWING MEARS exhibited a man, twenty-one years of age, who suffered from occlusion of the jaws due to cicatricial contraction, dating from the eighth year of his age, when he had a severe attack of scarlet fever, with intense inflammation of the mucous membrane of the buccal spaces, more severe on the left than right side, with copious discharges of saliva and pus from the cavity of the mouth, lasting for at least two weeks. The conjunctiva of both eyes was affected, the inflammation being very severe, with copious discharges of mucus and pus, and closure of the eyes, vision being obliterated for two weeks. Very soon after this attack of scarlet fever closure of the mouth was present. Patient used wedges of soft pine wood for the purpose of keeping his jaws separate as far as possible. At this time the distance to which the jaws could be separated was about a half inch, and the degree of possible separation has gradually lessened, until now, October, 1897, the anterior teeth cannot be separated to a greater extent than a tenth of an inch.

All of the teeth in the upper jaw are in a state of decay, some absent on the right side. In the lower jaw of right side the lateral and central incisors are in a state of decay, as well as the posterior teeth as far as can be seen, and turned inward towards the oral cavity. Many of the teeth of both upper and lower jaw are absent, the patient stating that some of them were swallowed, as he was unable to get them out of the cavity of the mouth when they became detached. Others, being much decayed, came out in pieces, which were removed from cavity of mouth with a hair-pin. On the left side, examination shows that the buccal space is occupied by a firm, resisting mass of cicatricial tissue, extending

from the position of the canine tooth of upper and lower jaw to the last molar of each jaw. On the right side a mass of cicatricial tissue, not so large in extent as the left, occupies the buccal space, extending from the second bicuspid tooth to the position of the last molar tooth of each jaw. The lower jaw presents some indications of absence of growth, with some retraction of the chin, giving an appearance to the face which is characteristic in these cases. On the left side, in middle of cheek, on the external surface, is a cicatrix about a half inch in length, directed horizontally from before backward, which cicatrix is the result of an incision made into an abscess, which was thought to be connected with a diseased tooth, occupying the molar region. Patient states that this abscess was opened in August, 1897. Patient takes food, mostly of soft and liquid character, with a spoon, whose point is placed between the teeth. Patient has not suffered with any attacks of pharyngitis or laryngitis. Patient is five feet ten inches in height and weighs 122 or 123 pounds. Muscular system is fairly well developed, showing nutrition to be good. Has had attacks of coryza of limited duration.

There is slight impairment of hearing in the right side, this ear having been affected when he had scarlet fever, at which time there was a discharge of pus from the ear, which has continued, at intervals, up to the present time.

October 30 an operation was performed, and the jaws were opened to the extent of two inches, and seventeen badly diseased teeth were removed. The lower jaw on the left side was found to be necrosed and the process was cut away. The cicatricial tissue on each side in the buccal spaces was freely divided, leaving a mass about a quarter of an inch in thickness on each side. The masseter muscle was divided freely on each side. On the left side all of the tissues were found infiltrated with plastic matter, the result of an attack of inflammation on that side, which led to necrosis of the process, caused possibly by the diseased teeth. The jaws were separated by introducing wedges of soft pine and afterwards using the gag. Two ligatures were introduced, one on each side, extending from the canine tooth to the third molar carried behind the cicatricial tissue, between its posterior surface and the integument. Into the buccal spaces were packed six pieces of 5 per cent. iodoform gauze, an inch wide, a yard long, three on each side. Patient was put to bed and rallied promptly.

Some bleeding occurred and swelling of face. Patient was kept on light diet for several days.

Three days later the gauze was removed, the cavities were syringed with a weak solution of carbolic acid, gag was used to separate the jaws, and fresh gauze introduced. Dressing was done, and gag used every third day, until November 20, when patient was again etherized, and four more teeth and portions of the bone that had become necrosed were removed.

The canals formed by the ligatures were found free from hæmorrhage on passing the probe and the intervening tissue was divided by the blunt-pointed bistoury carried along the grooved director, and the cavities were packed with gauze, which was removed the third day, and renewed after mouth was cleansed, and gag used. Since November 25 gag has been used twice daily, and December 2 gauze was permanently removed. Patient can now open his mouth to the extent of one inch and a half without using the gag and to two inches with its aid. The temporo-maxillary articulations and all of the elevator muscles of the jaw were very rigid from disuse. On the left side inflammation had still further increased the density of the tissues, and made the task of exercise of the muscles and joints with the gag more difficult. Absorbents, stimulating embrocations, and massage are used to facilitate the work. The rigid condition of the structures can be appreciated when it is considered that the jaws have been firmly locked for a period of thirteen years. The patient will employ the gag, the use of which gives him no pain, for two months.

DR. DEFOREST WILLARD said that one of the nearest approaches to an ether death that he had ever seen was in a case of occlusion of the jaws, in which there was only about half an inch of space between the jaws. The patient had taken solid food before the etherization. During the operation vomiting occurred, and he very nearly died from suffocation before relief could be afforded. It was impossible to quickly clear his mouth through so small a crevice.

He asked Dr. Mears if he made a large open incision through the mucous membrane in order to turn out the necrosed process.

DR. MEARS replied that there was no nausea or vomiting in this case; it would have been a very serious matter if this condition had been present.

He recalled the case of a boy who had occlusion of the jaws, who had a small space made for him by a dentist by extracting an incisor tooth, and through this he was fed. On one occasion he went to his mother's pantry and found a pie of which he was very fond. He ate this pie by pushing pieces with a stick into his mouth. He filled his mouth full and came very nearly suffocating.

Esmarch had proposed to relieve certain cases of locked jaw by section of one or other side of the lower jaw with an attempt to form a false joint. Esmarch called attention to this subject in a paper, which he read at the German Congress at Göttingen, and alluded to the various operations which had been suggested and performed to relieve occlusion due to cicatricial contraction, as in this case, calling attention to the vain efforts which had been made by incision, excision, transplantation of mucous membrane, and of the integument into the buccal space, hoping that by so doing reformation of the cicatricial tissue would be prevented. All of these methods were valueless, because inevitably the scar tissue reformed and the contraction was firmer than before. He therefore advised abandonment of any effort to destroy the cicatricial tissue, but recommended allowing it to remain and advised the formation of a false joint. Dr. Mears had never done this operation, because he did not think it gave good results. It creates deformity, and the patient can open the mouth on one side only. If it is a case of double occlusion, it is of no avail. All of the operations heretofore suggested were performed by incisions outside of the mouth, while all Dr. Mears's operations, whether the occlusion is due to cicatricial tissue, formation of an osseous band holding the jaws together, or to a synostosis of the articulation, are done within the mouth. He had operated successfully in cases where occlusion had existed for sixteen, seventeen, eighteen, twenty-seven, and thirty-two years. In all of these cases, where cicatricial tissue has been the cause, he had pursued the same method as in the patient presented. Where an osseous band held the jaws together he divided with a saw. Where the joint was involved he made a section of the ramus, carrying the knife beneath the masseter muscle, and then passing in a saw, and dividing the bone, the temporal and external pterygoid muscles, and removing condyloid and coronoid processes with the forceps. His object in doing this

was to form a capacious false joint. Originally he operated by simply dividing the process, but found that this was not satisfactory. He tried as far as possible to avoid the position of the inferior dental foramen. All of these operations he had done through the cavity of the mouth. This is of great advantage in all cases, especially of females. He thought the trouble had been that surgeons have been afraid to make large enough cavities, and in the process of repair the results have not been so good as they would have been had they been larger.

THE ABUSE OF IODOFORM.

DR. W. G. PORTER read a paper in which he sketched the history of the introduction of iodoform into surgical use, and gave extracts from the writings of Mosetig-Moorhof, Moleschott, Miller, Burkhardt, Stillé and Maisch, Le Dentu, Hayes, and others. He called attention to the possibility of toxic effects from its too free use, quoting especially Treves and R. W. Taylor upon that point. As to the manner in which iodoform acts favorably as an application to wounds and granulating surfaces, he gave the views expressed in Hare's work on therapeutics. After this review of the subject he earnestly protested against its routine use to the exclusion of other dressings equally as good and free from its many objections. He said that the general practitioner seemed to think that the only treatment for every furuncle, carbuncle, swelling, ulcer, incision, or wound was to cover it with iodoform until their patients went around like a walking pestilence, the objects of loathing and disgust to their friends and themselves, and of just opprobrium to their physicians. In hospitals there might be some excuse for its free and practically unlimited use. But in private houses and particularly in private patients who were going about attending to the affairs of life there could certainly be no excuse for its use, unless in the rare and altogether exceptional cases in which nothing could possibly take its place. He asked what right any physician had by his treatment to direct the attention of every one to his patient. And yet to-day how few patients who are afflicted with chancre, herpes, chancre, or almost any other mucous or cutaneous lesion, are spared the infliction of iodoform. He gave two examples by way of illustration which had recently come to his attention. The first was a man with a syphilitic ulceration of

his face, who had been subjected to the iodoform treatment for a period of four months, absolutely without relief, the ulcer constantly spreading under the caked and incrustated mass of iodoform. He was the proprietor of a prosperous restaurant in a business part of the city, but the combined odors of the iodoform and the badly treated ulcer drove his customers away, and in less than a year he was a bankrupt. The removal of the iodoform and the accumulated filth with proper local and constitutional treatment cured him in three weeks,—but his customers had gone never to return. The second case was a man who had been operated on for appendicitis. A fistula resulted. Not fæcal, but discharging freely a non-odorous albuminous fluid, the only treatment prescribed for which was packing lightly with iodoform gauze. He had his living to make, was able to go about and attend to his business after a long and extensive illness, and yet he was constantly handicapped by the dreadful odor of iodoform, from which he could never escape. The removal of the iodoform gauze and the more thorough drainage by a lead wire healed the fistula in a few weeks.

DR. THOMAS G. MORTON said that he did not think the use of iodoform was increasing, but, that on the contrary, it was decreasing. In his ward at the Pennsylvania Hospital there was no patient at present upon whom it was being used. Occasionally, however, iodoform gauze is used as a packing or drain in or about foul cavities. Acetanilide gauze has largely superseded iodoform. A number of druggists who do a large business had told him that the call for iodoform had lessened enormously.

DR. DEFOREST WILLARD said that he used iodoform very little. He would much rather smell fæcal pus from the ischio-rectal fossa than iodoform. Thymol diiodide is cheaper and better for fresh wounds. Thymol and acetanilide are sufficient for nearly all cases. He uses iodoform gauze in foul pus cases, but in all clean wounds preferred thoroughly dry sterilized gauze. By using thymol diiodide one is not obliged to pay for the trade name, aristol.

DR. R. H. HARTE agreed that public feeling was opposed to the odor, but he did not think it half as objectionable as many of the perfumes so noticeable on the women who go to the theatre. Like every good thing it has been abused, but still it is a valuable drug. All recognize the virtues of mercurial salts,

but these also have been abused. He thought iodoform was used nearly as much to-day as ten years ago; certainly during his half of the term at the Pennsylvania Hospital it was used as much as it ever was. At the Episcopal Hospital it was also used very extensively in the wards by his colleagues. As to the poisonous effects, he had never seen any bad results in his own practice, but he had seen bad effects from it where it was used as a primary dressing in extensive burns. He remembered a series of these cases that were treated by iodoform, and almost without exception poisonous symptoms followed. It was a very valuable therapeutic aid. In tuberculous joints iodoform in glycerine is of great use. It is also very valuable in bone-disease. His method of using it in cases where he had removed a large amount of bone was to clean out the cavity thoroughly, wash thoroughly with iodoform and glycerine, and pack with iodoform gauze. He thought the results obtained in dealing with bone-disease in this way were unquestionably much more satisfactory than with the old methods with carbolized oil. Although iodoform was greatly abused, he considered it a most valuable topical therapeutic agent.

DR. H. R. WHARTON said he did not remember ever having seen a case of iodoform-poisoning. As regards poisoning, the conditions where it would be most favorable for its development would be in the modern method of using iodoform emulsion injections. He knew cases where it had been used for a number of weeks for tuberculous joints, but he had never seen symptoms of poisoning. He did not use it as much as he formerly did, but he believed it to be a very good remedy in certain cases, as in bone cavities and especially in cases of abscess about the rectum, where no packing could take its place. Used in the same way in operations about the mouth iodoform packing remains sweet longer than any other packing. Experience shows that its use is less safe at the extremes of life.

DR. GEORGE ERETY SHOEMAKER said that he had been unable to find anything which would take the place of iodoform in securing cleanliness in a *moist cavity*. He had had gauze impregnated with aristol, acetanilide, and other materials, but had found that iodoform gauze would remain sweet twice as many days in a moist cavity as would any other preparation. He thought, therefore, that nothing could take its place when, for

example, one is obliged to use a gauze drain after abdominal section for serious types of pelvic abscess or in some cases of appendicitis, or in packing the uterine cavity. The remarkable duration of the influence of iodoform in keeping a drain sweet was recently illustrated accidentally. He had done a vaginal hysterectomy for pyosalpinx and metritis, and had put in three strips of iodoform gauze for drainage. In removing these one piece, about three yards in length, was left behind, and remained in the abdominal cavity for one month with an end protruding into the vagina. During this time it was thought that the correct number of pieces had been withdrawn. The patient made a nice recovery from operation, and at the end of three weeks was up and about the ward, with a normal temperature. The other piece was found at a routine examination and gave no trouble. On withdrawal it was still yellow in places and did not smell offensive. To his mind there was no other substance which would have kept it sweet under such circumstances.

DR. W. JOSEPH HEARN said that the rational use of iodoform was as much indicated to-day as it ever was. Some people use it for syphilis, but it is perfectly useless. It is useful in chancreids, and nothing can take its place. Its use to the public mind has not the same significance now that it formerly had. People used to think it meant venereal disease wherever it was smelled. When he had an operation in which there was pus and he had to drain he used iodoform; where there was no pus he did not need anything. He rarely used the powder in any surgical work, but the iodoform gauze whenever indicated.

DR. G. G. DAVIS said there were two classes of cases in which powders are used antiseptically, one in which the drying element was desired and the other in which antisepsis was to be obtained. In the latter case he did not think there was anything to be compared to iodoform. He had tried various substitutes, but they had not compared in efficacy to iodoform. In the other class of cases he thought it is almost immaterial which of the various powders was used. Iodoform is the most reliable agent we have to stop suppuration when actual contact can be secured. It is the most permanent of all the available drugs, and its action does not cease within a short time of its application; neither is it readily dissolved. The gauze impregnated with it retains its action for a long time, and it is for that reason preferable in many

cases to a plain packing. Plain gauze becomes impregnated within a day and contains no material for the prevention of the putrefactive process. Iodoform gauze seems to stop the secretion and prevent further putrefaction. He had tried one after another of the various remedies, and the only one he really felt that he could rely upon was iodoform. For comfort and drying of wounds and absorptive procedures almost any one of the powders can be used with similar results, but not for antiseptis.

As regards poisoning, he had seen two or three cases in old people in which there was a certain amount of constitutional disturbance, and in which the iodoform had been used in connection with operative procedures. In those cases one could not determine exactly the relative responsibility of the operative procedures and the iodoform, but subsequently the patients developed delirium or mental disturbance, which he believed were due to the iodoform. Although those which he had seen had not been of an extremely advanced and serious type, still the mental disturbance in those of advanced age had been so marked as to cause him to be very careful with them.

DR. THOMAS S. K. MORTON stated that his present employment of iodoform was limited to its use as a gauze for packing and drainage, especially where dryness and antiseptis were required for prolonged periods; as an injection in emulsion with glycerine for tubercular joints or abscesses; and, occasionally, in the shape of a five-grain suppository in tubercular affections of the rectum. He could not remember having used the substance as a dusting powder for several years. He had seen violent inflammations and vesicular eruptions following its use upon the skin, especially when compressed against the cuticle under a splint in children. He had frequently observed more or less serious constitutional effects from a copious use of the powder in former times, and was ever mindful of the unpleasant possibilities even of iodoform gauze packing. For the latter he has never been able to find a satisfactory substitute, but was inclined to think that iodoform gauze as commonly used was entirely too strong. Dr. Morton for two years has had his gauze prepared of 5-per-cent. strength in bandages of various widths and five yards long. These are steamed at 230° F. for half an hour, by which time about from 1 to 2 per cent. of the iodoform has been vaporized. Hence his gauze, when introduced into a wound, is

not stronger than 3 or 4 per cent. of its weight. From this weak gauze he had noticed slight congestive symptoms with rise of temperature, and mild delirium a few times when large quantities had been inserted. The strips were never lost in wounds, because only one continuous piece of bandage was usually put in. Where dusting powders are required, he has come to rely largely upon bolted acetanilide, or acetanilide and compound stearate of zinc, or acetanilide and boric acid. Acetanilide as a gauze has been a failure because of rapid absorption of the drug by the tissues. For chancroids he employs a powerful spray of peroxide of hydrogen, and supplies the patient with a half ounce of acetanilide with instructions to wash with soap and water twice daily, and afterwards heap as much of the powder upon the sore as it is possible to retain. Then the prepuce is drawn over without dressing. This will cure nine-tenths of all chancroids in a few days. The other tenth will require nitric acid or other destructive agent in addition.

DR. J. EWING MEARS said that possibly he had given iodoform as thorough a test as any one in its use in the cavity of the mouth. He had used it for many years in wounds of the mouth and in suppurating cavities in a 5-per-cent. strength. Never had he seen a well-defined case of iodoform-poisoning, but in one or two cases he had seen some effect manifested in the urine by its absorption, but no delirium or any well-defined symptoms. It may appear very strange, but patients do not complain generally of its use in the mouth. They may complain slightly of it at first. The first dressing which he makes is three days after the operation, and then again in two days, but in cases of copious discharge every day. He had had complaints in private practice, and remembered one case who went away, but finally came back, and he tried it again. It was a case of syphilitic ulcer, and he did not care about letting all his friends know of his condition. He had occasionally used aristol, but by preference he employed iodoform. He had seen nothing in his practice which would compel him to give it up.

RADICAL CURE FOR INGUINAL HERNIA.

DR. JOHN B. DEEVER read a paper entitled "A Modified Operation for the Radical Cure of Inguinal Hernia," for which see page 459.

DR. R. H. HARTE said that his experience in operations of this kind had extended over quite a number of years, and he had tried to follow the cases up. One case returned the other day on whom he had operated three years ago. The man was a bad subject, and had a recurrence. This was the only recurrence he had had an opportunity of seeing, but he had no doubt there had been others. The one point in his operation, which is a modified Bassini, is in the closing of the canal. The effect of transplanting the cord necessarily weakens the abdominal wall at that point. There is no trouble about closing the canal. Even when the operation is carried out right he had seen cases where it had recurred. Only recently a man had come to him with a recurrence. He had attempted to operate several times, but the attempt had been worse than useless. Some time ago there was a case at the Pennsylvania Hospital who had a mania for having his hernia operated upon. He thought the method of using the sac as a plug to be good, and he had done it in a number of cases, but not as done by Dr. Deaver, although the results seemed to be very satisfactory. If one takes the best points of the operations of Bassini and of Macewen one can get a fairly good abdominal wall, but the weak point will be at the so-called internal abdominal ring.

MATTRESS FOR OPERATING-TABLE, HEATED ELECTRICALLY.

DR. DEFORD WILLARD presented a mattress made by the H. W. Johns Manufacturing Company, of Philadelphia, being constructed of a mesh of insulated wires, covered with rubber sheeting for protection from blood and water. It is made of a size convenient for operating-tables, and its supply can be obtained from any ordinary electric light socket by the removal of the lamp-bulb.

It is about half an inch in thickness, and is of especial service upon glass tables, which are cold and depressing. The current is regulated by a cock which controls the amount of electricity to three grades. Should No. 3 become too hot for the patient, a pleasant temperature can be maintained at either stops 1 or 2. The occasional attention of the anæsthetizer is all that is required; but if the rubber is first covered with a blanket and

then with a sterile sheet, burning of the patient need never occur, even when a full current is turned on.

In long operations, and in all cases where the loss of blood is great, either during the operation or before, as in accident cases, the saving of the loss of animal heat is most important.

Most surgeons realize too little the importance of avoiding the depressing influence from lowering of the temperature that so often occurs. Many elements conspire to depress the patient during the operation, the effect of ether, hæmorrhage, exposure of the surface, wetting of the body from solutions, etc.

Dr. Dudley P. Allen (*Transactions of the American Surgical Association*, Vol. xiv, p. 367) has well shown, in his experiments upon dogs, the benefit to be obtained during the anæsthetization, by husbanding this important element of animal heat, and that the radiation of heat should be prevented, by covering the patient with cotton; the loss of normal heat being in direct proportion to the exposure of the surface. The effect of ether itself is decidedly to lower the temperature. He shows also that the temperature of the room has a decided effect on the temperature of the individual, and that it should not be too high nor too low.

The use of this mattress in patients of low vitality, as in excision for tubercular hip-disease, protracted laparotomies, prolonged excision of glands, etc., is of the greatest importance.

In severe crushes also, where the individual has not only suffered largely from loss of blood, but has also endured the shock of traumatism, together with possible exposure upon the cold ground, this warm mattress offers, during operation, the best means of turning the scale in his favor.

When such a patient is removed from the table, moreover, this pad placed beneath him, on his bed, will maintain an equable temperature throughout the night, far better than hot water-bags, or other measures.

Its cost of thirty dollars is but little compared with the lives that it may save.

Dr. Willard had used the mattress shown for a year, with the most satisfactory and helpful results. The wire had not failed him, nor broken once in that time.

EDITORIAL ARTICLE.

ULTIMATE RESULTS OF CASTRATION AS A MEANS OF RELIEF FOR OBSTRUCTIVE HYPER- TROPHY OF THE PROSTATE.

IN June, 1896, I published in the ANNALS OF SURGERY the results of the cases which had been under my personal care in which removal of the testicles or section of the vasa deferentia had been resorted to for the relief of obstructive hypertrophy of the prostate. I was then able to report eight cases of castration, and three of vasectomy. The amount of relief to the obstructive symptoms which had followed in these cases was very notable, and seemed to justify the conclusion that in these procedures surgery had gained a most valuable resource in dealing with conditions that were not only harassing, painful, and dangerous, but often intractable to any available practicable means of treatment before supported. In the eighteen months that have since elapsed there have been two additional cases in which I have resorted to castration, these I desire now to add to the record: One case, aged seventy-two years, four months before had been subjected to suprapubic cystotomy and double vasectomy on account of complete prostatic obstruction, not relievable by catheter. At the end of two weeks he found himself able to urinate *per urethram*, after which the suprapubic wound rapidly closed, and by the sixth week was soundly healed, and normal urination seemed restored. This improvement, however, proved to be transient, and marked obstructive symptoms becoming gradually more troublesome again developed, requiring the frequent use of a catheter, which was difficult and painful, until August 12, 1896, when he was subjected to castration. Smooth

recovery from the operation followed, with rapid amelioration of his obstructive symptoms, until by the end of four months thereafter he was performing his urinary functions normally, and his general health and strength had become quite restored.

The second case was that of a robust old man, a laborer, aged seventy-five years, who had always enjoyed good health, with the exception of late years of some increase in frequency of urination. Suddenly complete retention developed, which after ten days of systematic catheterization and rest in bed still persisted. The passage of a suitable catheter was not difficult, but the retention remained complete, and rectal examination showed considerable enlargement of the prostate, the right lobe being the larger. The degree of intelligence and the social state of the man were such as to preclude the idea of teaching him to use a catheter in a cleanly way, and any attempt in that line, it was believed, would have been the beginning of infective cystitis. He readily acceded, however, to the suggestion to have the testes removed. This was accordingly done November 8, 1897. Uncomplicated healing without any mental disturbance followed the operation. No change in his condition of urinary obstruction was noted until the twelfth day thereafter, when he twice during the day voluntarily voided a little urine, but from fifteen to eighteen ounces of residual urine still persisted. This was still his condition one month after operation, but from this time a gradually increasing freedom in voluntary urination was noted, until December 23, six weeks after the castration, he was urinating with apparently normal freedom, and the introduction of a catheter immediately after urination showed that there were but two ounces of residual urine.

The favorable immediate results obtained in these two cases, now first reported, are similar to those experienced in the preceding eight, and are like those met with in a very large number of cases which have been reported by others.

There has been no mortality, or even suggestion of danger

of such an event connected with the operation in these cases, although Cabot, writing in 1896 (*ANNALS OF SURGERY*, June, 1896), found a mortality of 19.4 per cent. to have attended the cases collected by him from various sources (203 cases, thirty-nine deaths). But, obviously, it is one thing that death should follow an operation; quite another thing that death should be due to the operation!

It would, perhaps, be a more just interpretation of the facts to say that in a considerable proportion of the reported cases—about 20 per cent.—the conditions preceding the operation had been such as to entail a speedily fatal result notwithstanding the operation, not denying the fact that probably in some instances the inevitable end had been accelerated by it, for the remark is also a just one that a serious pathological condition, in the course of which a surgical operation is done, is prone to be aggravated by such operation, if by it the condition is not at once greatly relieved. Castration done on a patient moribund with uræmia; castration done on a patient profoundly prostrated by sepsis from a suppurating prostate or kidney, or necrotic bladder; castration done on a patient with overdistended bladder with pressure effects upon the kidneys; castration done on a patient worn out with the suffering caused by the presence of a calculus in the bladder, will, if unaccompanied by the measures required for the immediate relief of the urgent conditions, be productive only of harm. It is quite evident that castration should not be resorted to in such cases as these mentioned, until after the pressing emergency has been relieved by the use of appropriate measures and a favorable state has been created for the introduction of a procedure which may gradually, and possibly only after the lapse of weeks, induce a subsidence of the prostatic obstruction. The value of such a course is strikingly illustrated in two cases of my series, in each of which by suprapubic cystotomy free bladder drainage was provided for and maintained for some weeks before resort was had to castration.

Of more importance is the possible effect upon the mind and disposition of the man produced by withdrawing from him the special stimulus furnished to the economy by the glandular products of the testes.

Acute mania, dementia, and gradual loss of vigor, causing the patient after a time to succumb to conditions which before the removal of the testes had been well borne, are the states which have been more especially ranked as fairly frequent sequelæ to the operation. The later history of castrated prostatics is therefore of special interest from this point of view. In my previous report I gave the details of one case in which a distinct tendency to dementia developed immediately after the operation in a man, seventy-two years of age, with an atonied overdilated bladder, dribbling at thirty-seven ounces. At the end of three months, however, by which time the function of urination was being normally performed, his mental condition had greatly improved. His later condition is unknown to me.

One man, sixty-eight years of age, died of dysentery some months after castration.

One man (the second case reported in this paper) is of too recent date, as an *opéré*, to have any late history. The remaining seven cases I have been able to follow, and their condition to-day, in brief, is as follows:

CASE I.—Time since castration, three years; present age, seventy-seven; hail, hearty, and active physically and mentally. Still has five ounces of residual urine, which he evacuates with catheter night and morning. Urinates spontaneously every two or three hours.

CASE II.—Time since castration, two and a half years; present age, fifty-eight; a clergyman in charge of an important church; states that his physical vigor and his mental grasp have notably improved since operation. His originally long overdistended bladder, dribbling with sixty-four ounces, still halts with ten ounces of residual urine, requiring catheter for its removal.

CASE V.—Another clergyman. Time since castration, two and a quarter years; present age, fifty-four years; still continues to preach with acceptability and to administer the affairs of his parish with prudence. Still has some residual urine and a chronic cystitis which requires the use of a catheter and daily irrigation of the bladder to keep under control. Reports that urination is now attended with more difficulty and pain than it was during the first year after the removal of the testes.

CASE VI.—Time since castration, two years; present age, sixty-seven years; general health excellent; mental grasp undiminished; still attends actively to the affairs of an important business. His chief annoyance has been the frequent occurrence of uncomfortable flushes of heat similar to those experienced by women at the time of the menopause.

CASE VII.—Time since castration, one and three-quarters years; present age, sixty-four years; in good health, sound mind, and free from all urinary disturbance.

CASE VIII.—Time since castration, one and three-quarters years; present age, seventy-two years; in good health, sound mind, and free from all urinary disturbance.

CASE IX.—Time since castration, one and a half years; present age, seventy-four years; is hearty and vigorous; devoted to equestrian exercise; manages with skill a spirited horse.

This completes the record of my personal experience to January 1, 1898. Certainly in these cases the relief from the special sufferings and difficulties incident to obstructive prostatic hypertrophy has been great; in some of the cases it has been complete, the freedom of urination having been restored to the normal point; in yet others, some obstruction persists, even after the lapse of some years, requiring catheter-help at times, but in a degree very much less than before castration.

This relief has been secured by a procedure that has been free from pain and has been attended with but little, if any, risk to life; the worst blur upon the record is the infliction of a few

weeks of childishness upon one patient. The procedure is one that demands no special surgical experience, nor elaborate ménage, nor peculiar or costly instruments for its proper performance. It seems to me that it has at least won a place for serious consideration whenever the problem of the relief of urinary obstruction due to prostatic hypertrophy is presented for discussion.

LEWIS STEPHEN PILCHER.

INDEX TO SURGICAL PROGRESS.

BONES,—JOINTS,—ORTHOPÆDIC.

I. Repair of Bone on a Buried Prosthetic Apparatus.

By DR. CL. MARTIN (Lyon). As a result of a series of experiments M. Martin comes to the following conclusions:

(1) It is possible to obtain complete regeneration of a bone, of a portion of the diaphysis, or of an articular extremity by furnishing a solid and light apparatus which can act as a guide to the process of ossification.

(2) This apparatus may be made of platinum-iridium rods connected by cross-pieces of the same metal. It is placed in the tissues or fixed in the bone by platinum screws. The apparatus ought to have the form and volume of the bone or that portion of the bone it is desired to have regenerated.

(3) It serves as a guide to the process of ossification, and as a mould for the new-formed bone, which can then take the form and volume of the bone removed.

(4) It is not designed as a substitute for the bone. Its *rôle* is only temporary, but when regeneration is complete it remains definitely included in the new bone, where it is well tolerated.

(5) It maintains the fragments apart and re-establishes the continuity of the bony column. It prevents the interposition of muscular and other soft parts, which might hinder ossification and entail pseudarthrosis. Bone chips can be placed inside it, to fill the cavity of the apparatus, and contribute to the new formation of bone.

(6) Two causes may compromise the final result. (a) Mobility of the apparatus. This explains why, in the experiments,

results were more satisfactory in the bones of the forearm and leg than elsewhere, because here the second bone acts as a splint.

(b) Infection of the wound and suppuration. If this is not too great or acute it does not absolutely prevent osseous regeneration.

(7) Such apparatus may be of use in all cases of loss of substance in bone, whether traumatic or inflammatory.

(8) Thanks to this apparatus, one may hope to produce bone at a determined point of the skeleton,—*c.g.*, to create a new cotyloid cavity in congenital dislocation of the hip.—Proceedings of French Congress of Surgery, *Revue de Chirurgie*, No. 11 (Supplement), 1897.

JOHN F. BINNIE (Kansas City).

REVIEWS OF BOOKS.

ORTHOPÆDIC SURGERY. By JAMES E. MOORE, M.D., Professor of Clinical Surgery in the College of Medicine of the University of Minnesota. Philadelphia: W. B. Saunders, 1898.

This book, the author states in his prefatory remarks, is intended as a text-book for students and a ready-reference book for general practitioners, and we concede that it is admirably adapted for both these uses. It contains material all of which is of practical value. The text is not encumbered with all of the methods used in orthopædics,—approved and disapproved; but only the simplest kinds of apparatus is described and those methods which the author has found by his own practical experience to have served him best. Much attention is given to early diagnosis. The book is the work of a general surgeon who believes that the orthopædic surgeon should know how to operate and that the general surgeon should be an orthopædist, thus avoiding the dangers of extremes, for the author believes that the general surgeon is too prone to operate upon cases which might better be treated by more conservative methods, and that the orthopædist is too prone to treat by tedious and conservative methods cases which might be cured by the radical application of the knife. He believes that the scope of orthopædic surgery should not be too clearly defined, because it is so essentially a part of general surgery that efforts to establish a dividing line between them are likely to jeopardize the best interests of the patient. The author speaks of the growth and popularity of this branch of surgery, and recalls that when he graduated, in 1873, his Alma Mater, Bellevue, was the only institution in the world which had a special chair of orthopædic surgery.

The book is full of good practical hard sense. The greatest mistake in using plaster, it says, is in using too much. Speaking

of the treatment of scoliosis, the author says that the natural tendency is to apply some sort of brace for the cure of this deformity, but after several years' experience he is prepared to state very emphatically that, in the vast majority of cases, this sort of treatment is worse than useless. These jackets are in nowise curative, but only interfere with the natural development of the muscles of the back. The rational treatment of these cases is in the line of gymnastics, massage, and electricity.

Phelps's operation for club-foot, he believes, is liable to be brought into disrepute by general surgeons who are not content with orthopædic measures, but apply the operation indiscriminately to every case of talipes and neglect the necessity of mechanical after-treatment.

It is hard to agree with the author in his statement that operations for tuberculosis upon the ankle and tarsus are practically useless, and that a well-developed tuberculosis of the ankle of tarsus in the adult is best treated by amputation. We should also take exception to the statement that hammer-toe, when only one toe is involved, is best treated by amputation at the tarso-metatarsal junction.

There are frequent allusions to one, Lorenze. We believe that the author refers to Professor Lorenz, of Vienna.

The book is eminently practical. It is a safe guide in the understanding and treatment of orthopædic cases. It is well written. The illustrations are good. It should be owned by every surgeon and general practitioner. We predict for it success.

JAMES P. WARBASSE.

THE NORMAL AND PATHOLOGICAL CIRCULATION OF THE CENTRAL NERVOUS SYSTEM. By WILLIAM BROWNING, PH.B., M.D. 8vo, pp. 172, illustrated. Philadelphia: J. B. Lippincott Company, 1897.

For many years Dr. Browning has been deeply interested in the anatomy and functions of the central nervous system, and

has from time to time written articles embodying the results of anatomical studies or of clinical observation. These separate contributions have been fused with others of a similar nature and are now crystallized into this small volume. No attempt is made to give an elaborate and systematic treatise upon the encranial circulation, but rather to present some new and original investigations upon the subject, and in addition to record clinical facts and then to show the logical inferences that may be based upon them.

Eighteen articles are included in the book; of these the first and third are devoted to the details of original studies concerning the circulation in the human myelencephalon and in that of some of the quadrumana. The facts relating to the spinal efferents and to the supracerebral veins are of chief interest.

Inasmuch as several cases of symmetrically situated double cerebral hæmorrhage are reported in subsequent pages, experiments made with a view of artificially producing this rare lesion are also described. The results are interesting, but too few to justify any conclusions as to permanent etiology.

Various forms of hydrocephalus, cerebral softening following hæmorrhage, delayed traumatic hemiplegia, and a rare form of cranial aneurism are the principal cases that were observed clinically. Each of these cases is well worth study, but for the practitioner the article of the greatest importance is the closing one devoted to the differential diagnosis of the several forms of encranial apoplexy,—hæmorrhage, embolism, thrombosis, and pseudoseizures. This diagnosis must be exact, for, as the author emphatically states, "upon this depends all our hope of usefulness, since they call in part for directly opposite lines of treatment."

Had all the facts so carefully collected been placed at the disposal of a more discursive or voluminous writer the volume would have been of much larger dimensions. As it is, Dr. Browning has presented us with a book in which the experi-

mental skill and accurate observation are clearly shown, but in the fewest possible words. No theories are advanced that are unsupported by facts, and the very terseness of diction will serve to incite others to amplify the subject along similar scientific lines.

HENRY P. DE FOREST.

THE ORIGIN OF DISEASE, Especially of Disease Resulting from Intrinsic as opposed to Extrinsic Causes, with Chapters on Diagnosis, Prognosis, and Treatment. By ARTHUR V. MEIGS, M.D., Physician to the Pennsylvania Hospital. 8vo, pp. 230, illustrated. Philadelphia: J. B. Lippincott Company, 1897.

"The portion of our work as physicians which consumes the greatest amount of time is diagnosis, for after that is once made, prognosis almost speaks for itself, and treatment, although the most important part of the practice of medicine, is in most cases simple, and its direction takes but little time." This thought, thus expressed by the author, has occurred to many other physicians ever since the "practice of phÿsick" became a profession. Each in turn has contributed his mite to render diagnosis more certain, and to-day all who are interested in whatever promises to advance our knowledge in this direction will welcome this valuable contribution of Dr. Meigs.

To fully grasp the management of disease a sound knowledge of pathology is necessary. Fully realizing this fact, Dr. Meigs has for many years, particularly in hospital practice, made it a rule at all autopsies to preserve for microscopic examination portions of the five great organs,—the heart, lungs, liver, spleen, and kidneys,—and of any other tissue, the appearance of which seemed to indicate disease. These tissues have been preserved and prepared in a uniform way, and the slides thoroughly examined. As a result of this careful and systematic observation many microscopic lesions have been detected that to the naked eye were not apparent. This vast labor during twenty-five years

of work is now made available for others, and illustrated by numerous etchings made from the author's own preparations.

Were there nothing else in the volume besides the illustrations these in themselves would well repay study, for they have been prepared by the aid of the camera lucida, and the image projected directly upon the steel plate of the etcher. This method is rarely employed, but the plates thus made are pleasing to the eye and of exceptional accuracy.

After each group of organs had been carefully studied it has appeared to the author that, with the advance of years, the production of fibrous tissue has relatively increased. This condition, aptly termed "fibrosis," is therefore pre-eminently the disease of age. Unfortunately for mankind, as a result of disturbances of the circulation, or of other conditions affecting the equipoise of health, fibrosis is not confined to the aged, but often appears before the mere lapse of years would account for its development. All the organs of the body may suffer from this premature antiquity, and the microscope easily demonstrates the pathologic changes that ensue.

The deductions drawn from these facts are interesting and in a great measure convincing. It would appear that fibrosis is a large and more or less permanent factor of degenerative changes. Certainly this is true in many lesions of the principal organs of the body, in diseases which may be regarded as intrinsic in their origin.

The closing chapters upon the diagnosis, prognosis, and treatment of chronic diseases embody many logical conclusions and practical suggestions concerning the manner in which these changes may be recognized or modified, but the enthusiasm of the author carries him over far in some of his conclusions, for, while the rôle of fibrosis is doubtless an important one, it is not to be regarded as the sole cause of "all of the ills that flesh is heir to."

HENRY P. DE FOREST.

REMARKS ON SURGERY OF THE BILE-DUCTS.¹

By CHRISTIAN FENGER, M.D.,

OF CHICAGO,

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CLINICALLY, it is impossible in all cases to separate the common duct from the rest of the bile-ducts. I shall point out some facts referring to the ducts in general and the gall-bladder, but on the whole limit my remarks to the surgery of the common duct.

(I) BILIARY COLIC.

Biliary colic is a symptom common to the whole biliary tract. First, as to the causation of pain, which we will consider irrespective of the presence or absence of icterus: There are three distinct factors operative in the causation of the pain,—namely, (a) incarceration; (b) inflammation; (c) retention.

(a) *Incarceration*.—Contraction of the wall of the duct around the obstructing stone or pressure of a stone too large for the duct against its wall, may cause the attack. The observation of Dr. Billings that a sound passed through a biliary fistula into the cystic duct caused pain in the right scapular region is highly instructive. It is said the narrower a duct through which a stone passes the more violent the pain. Thus the cystic duct, which has the narrowest lumen, would be the seat of the most violent pain from incarceration

¹ Discussion of papers by Dr. Arthur D. Bevan on cholelithiasis; Dr. Ludwig Hektoen on pathology; Dr. J. B. Herrick on diagnosis; Dr. Frank Billings on symptomatology; Dr. N. Senn, on sequelæ and complications, and Dr. L. L. McArthur on surgery of the gall-bladder, read before the Chicago Medical Society, March, 1898.

of a stone, much more so than if the wider common duct were the seat of obstruction (Lawson Tait). Courvoisier, in his monograph ("Casuistisch-Statistische Beiträge zur Pathologie und Chirurgie der Gallenwege," Leipzig, 1890), shows that of the nine cases of gall-stones reported in the literature, where death occurred during the paroxysm of violent biliary colic, there was a stone in the common duct in six, a large stone in the gall-bladder in one, stones in all parts of the biliary tract in one, and no autopsy made in one case. It is doubtful, therefore, if the cystic duct is more to be dreaded in this respect than the rest of the biliary tract.

(b) *Inflammation* of the wall of the duct in the region of the stone mechanically injures the epithelial surface and creates an atrium for infection. Typical attacks of pain and fever at intervals of months are found in most instances of remittent attacks of inflammation (suppuration) of the gall-bladder. Can the inflammation, however, be the cause of the daily colic, or pain occurring every few weeks? As Dr. Billings has pointed out, a small and non-obstructing stone in the diverticulum of Vater may be the cause of this colic. I made the same observation in Case V of my paper,—*"Stones in the Common Duct and their Surgical Treatment, with Remarks on the Ball-Valve Action of Floating Choledochus-Stones"* (*American Journal of the Medical Sciences*, February and March, 1896). In this case the small stone lay loosely in Vater's diverticulum. This, I think, may be explained as follows: A daily or weekly exacerbation of an existing subacute inflammation takes place, analogous to a protracted nasal catarrh or laryngitis, which gets better and worse at intervals.

(c) *Retention* of bile behind an obstructing (fixed or floating) stone or behind a valve or bend caused by adhesions is also found to cause biliary colic. It is probably the sudden obstruction only that causes an attack of colic, as none occurs in the cases of gradual obstruction; for example, following cancer of the duodenum or the pancreas near Vater's diverticulum.

At the present stage of our knowledge it is not possible, in a given case of biliary colic, to diagnose from the clinical symptoms which of these three etiological factors are operative. This may, however, be a possibility in the future.

(2) DIFFERENTIAL DIAGNOSIS.

Dr. Herrick has mentioned the fact that acute disease of the bile-ducts sometimes simulates acute intestinal obstruction. A case of this kind is the following:

I saw the patient, a woman of about forty, May 20, 1896, in consultation with Dr. Loevenson. She was suffering with all the symptoms of an acute intestinal obstruction, seemingly with peritonitis and nothing to point to the biliary tract. She was taken to the German Hospital of Chicago for operation. I opened the tympanic abdomen in the median line and found the peritoneum normal throughout, the intestines uniformly distended, and nowhere obstructed. A distended gall-bladder was the only abnormality found. I closed the median incision and made a lateral one over the gall-bladder. The gall-bladder was considerably enlarged, tense, free from adhesions, and somewhat congested. Thinking that the condition of the gall-bladder might not be the cause of the obstruction, but that the latter might be dynamic and of unknown cause, I resolved upon a cholecystostomy in two stages. I selected this operation as the one which, if subsequent events showed it to have been superfluous, would be least harmful in its effects. The symptoms of absolute obstruction continued unabated after the first operation. After thirty-six hours I felt constrained to incise the gall-bladder. Pus escaped and 140 good-sized gall-stones were evacuated. The symptoms of intestinal obstruction ceased immediately. She recovered with a fistula, in which one year later a cylindrical-celled carcinoma of the gall-bladder made its appearance.

Another point of interest in the diagnosis which has attracted my attention is the following: Does the shape of a given gall-stone, passed by the bowels, give us any clue by which we may locate its former seat in the biliary tract, or the place it occupied during the greater part of its period

of formation, and if so, where might we expect to find more stones?

(a) Stones with facets, pyramidal stones, I believe are ordinarily from the gall-bladder, as here the stones occur in groups.

(b) Stones with two parallel facets, barrel-shaped stones, are commonly from the ducts where they lie in a single row.

(c) Spherical stones with no facets, when single, and either large or small, may occur anywhere, but when multiple, I believe they often come from a dilated common duct.

As an exception, however, in the following case all the biliary passages were filled with pyramidal stones:

CASE I.—Repeated attacks of biliary colic; icterus; no tumor felt; operation; cystic, hepatic, and common ducts dilated and filled with stones; gall-bladder small, containing stones; choledochotomy; cholecystostomy; removal of stones. Recovery; no attacks of biliary colic since.

M. C., male, aged thirty-two years; clothing-cutter; referred to me by Dr. Abel.

Family History.—Father died at fifty-eight of heart-disease; grandfather and grandmother died at age of eighty-six and fifty-six years respectively. Mother died at sixty-eight of pneumonia. Patient had eight brothers and sisters, seven living and healthy. One sister died at age of twenty-eight of miscarriage.

Previous Illnesses.—Had small-pox at age of eight years, and typhoid fever at nine. When fifteen years old he had "swamp fever" in Mississippi and passed bloody urine for two days; had chills and fever and was in bed one week. Two weeks after this he was taken with a pain in the right side about one inch below the costal arch and an inch to the right of the median line. It was dull and aching and lasted about three weeks. Vomited for the first five days, irrespective of eating. In bed one week. No jaundice. Whole attack lasted three weeks. Since that time this pain would recur to a slight degree, especially after working hard.

In March, 1891, he had a second severe attack, which came on gradually. It started with vomiting and in two or three hours the pain began. The starting-point of the pain was as before, one inch below the costal arch and one inch to right of middle

line. Pain radiated outward to right. Nausea and vomiting; no jaundice; no tenderness; sick one day; morphine for pain.

In April, 1892, he was taken with another "cramp" two hours following a meal; vomiting brought relief. This recurred after meals for about one month.

In December, 1892, the dull aching pain below the costal arch recurred. Nausea and vomiting; no icterus. April, 1893, similar attack. Between the attacks he was free from all discomfort. Another attack in June, 1893, when a diagnosis of gall-stones was made by Dr. W. E. Quine.

April, 1895, had very severe pain, which was dull and boring in character. Vomiting. Pain continuous fourteen hours. Sick two weeks; no icterus; no gall-stones found. Pain radiated to right and was increased by respiration. It hurt him to step on the right foot heavily and a jarring would cause pain for six or eight weeks thereafter. Since then he has had attacks of pain about twice a week and of varying severity, sometimes being confined to bed.

Present Illness.—The last attack, as detailed above, occurred in March, 1896. Severe boring pain in same location as above and radiating to right. Severe vomiting brought no relief to pain. Icterus; no gall-stones found. Bowels constipated and have been so since 1879.

Examination.—April 8, 1896. Moderate icterus; abdomen loose, no tumor palpable. Pain on pressure is rather in region of appendix than gall-bladder.

Diagnosis.—Gall-stones in common duct or chronic appendicitis.

Operation.—Ether narcosis. Lateral incision; one and one-half inches of subcutaneous fat. Appendix not adherent; color normal; mesentery short. End of appendix bent over at right angles but not by adhesions.

Exploration of Hilus of Liver.—Gall-bladder small, reaches border of liver only, thick walled, reddish and velvety in appearance; I felt stones in gall-bladder. With a finger in Winslow's foramen I felt a nodular mass which I first mistook for a carcinoma of the head of the pancreas. Later, however, I felt part of the mass move, and I thought of gall-stones. As the appendix was free, I allowed it to remain. I intended to do a cholecystenterostomy. Incision prolonged upward two inches above costal border. Peritoneum sutured to skin. Assistants retracted

liver to right and upward and stomach and intestines to left. Hepatico-duodenal ligament was short (two and one-half inches). The finger in Winslow's foramen felt a nodular mass (Fig. 1) in which I could move a portion that felt like stone. I thought we had cancer and stones. I now pushed the movable part of the mass forward against my thumb on anterior surface of hepatico-duodenal ligament. Incision through peritoneum one inch in length, parallel to duct, and one-half to three-fourths of an inch from free border of ligament. A lymph-gland, the size of a pea, was pushed aside. Peritoneum and subperitoneal tissue pushed aside with thumb and the duct laid bare. A vein, the size of a match, passed along and parallel to the duct and was held away with forceps. Punctured the whitish duct with a needle and felt the grating of stones.

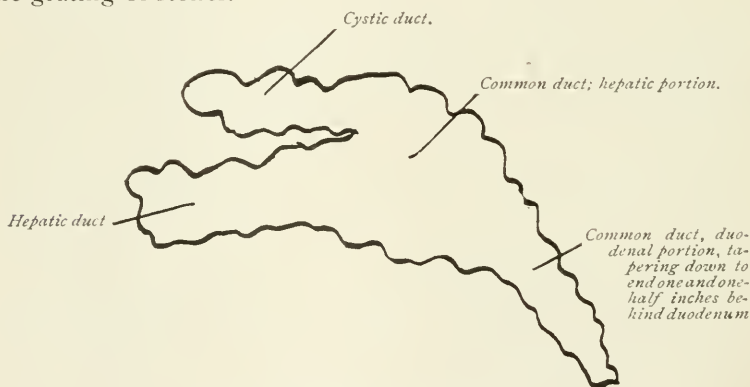


FIG. 1.—Shape of nodular mass.

Incision in duct, one-half inch long; clear, yellowish-brown bile exuded. With a sharp spoon I lifted out a stone the size of a large pea and ten or twelve more followed. Exploration of duct with little finger disclosed stones behind duodenum and in hepatic duct. I removed stones with long forceps and sharp spoon from retroduodenal portion of duct. I could feel the tapering, hard mass before mentioned (Fig. 1) becoming smaller as I removed more stones, until finally, after the last stone had been removed, it disappeared entirely.

From the hepatic duct ten or more stones were removed by the forceps and sharp spoon until no more could be felt with finger. Finger could be inserted in duct and passed to right for one and one-half inches. Did it pass into cystic duct or into

hepatic duct? I thought hepatic duct, but was probably mistaken. I could now feel a nodular mass in a horizontal line, with the finger in Winslow's foramen, and by manipulating I pushed out a stone into the common duct. It came out from behind a semilunar valve (Fig. 2), into which I could insert the third phalanx of my little finger and feel more stones. Forceps and

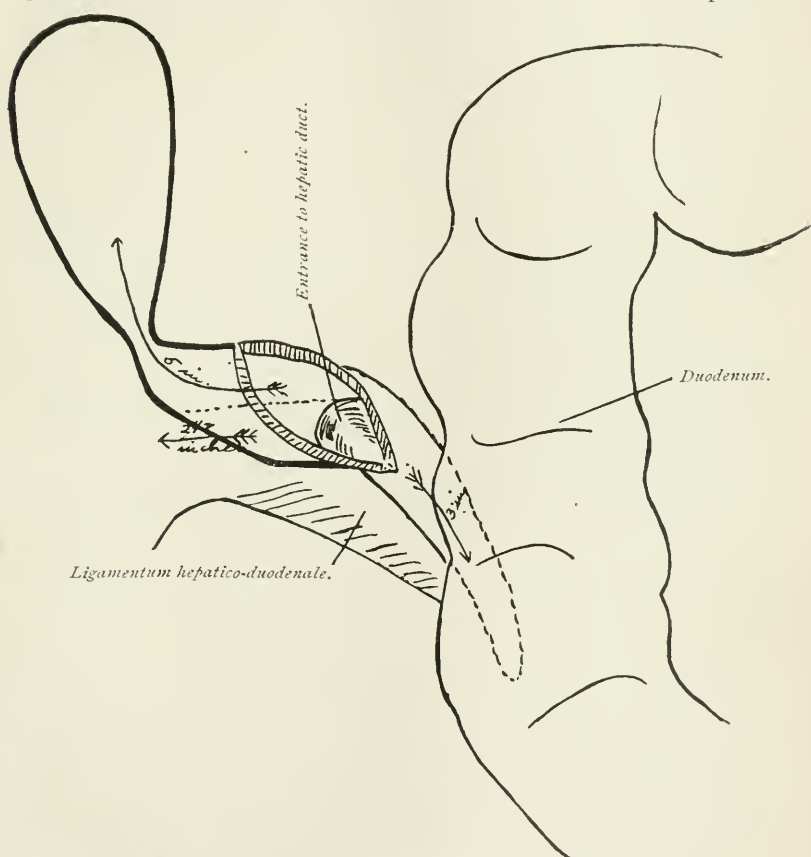


FIG. 2.—Showing horizontal portion where bougie passed behind the valve.

sharp spoon, inserted horizontally, brought out eight or ten stones and some *débris*. Finally, this nodular mass also disappeared. After the whole mass had disappeared, no more stones could be felt with a metal probe in any of the three arms of the Y-shaped mass.

An elastic bougie was passed down into the common duct

for three or four inches, and I believe that it passed into the duodenum, because two inches of the probe were beyond the point of the former tapering nodular mass. Elastic bougies would pass for two to three inches in the horizontal portion, the bougie passed behind the valve (Fig. 2). With sound passed along anterior surface of valve into the oblique duct, it would pass upward for five to six inches (Fig. 2).

The bile, which continuously ran out, was kept sponged away by an assistant.

I incised the gall-bladder, although I could not feel stones in fundus. I felt, however, a strand, like a string of beads, near the cystic duct. The walls of the gall-bladder were thick (muscularis and serosa, two millimetres, mucosa, two millimetres). Thirty-six stones were removed by being forced up from cystic duct by pressure and then removed with forceps or sharp spoon. Finally, nothing more resembling a string of beads could be felt in the upper portion of the cystic duct from Winslow's foramen. Gall-bladder was explored with finger, sound, and elastic bougie; the latter entered for a distance of three inches, but did not pass down into common duct; it was caught in a fold or the cystic duct may have been bent.

The wound in the gall-bladder, which was transverse across fundus and one inch long, was first united by four sutures through mucosa and muscularis. These were then buried by four sutures through serosa and muscularis. Twelve large flat sponges were used.

The gall-bladder was now covered with gauze and held away together with the liver to make room for suturing the common duct. Three sutures were passed through mucosa and muscularis, and three sutures through the serosa, which, when tied, covered in those first inserted. The threads, during the process of suturing, were left long so that the wound in the duct could be more firmly secured.

The gall-bladder was secured to the peritoneum with four sutures.

Abdominal wall sutured with nine sutures. Drains were inserted as follows: Along the pylorus, one strip to the hepatic side of Winslow's foramen, and Mikulicz glass drain surrounded by gauze down to wound in the common duct.

The sutures were disposed of as follows: No. 1 was tied;

No. 2 was left loose over gall-bladder; No. 3 was tied to exclude gall-bladder wound and drain from the drains to common duct; No. 4 was left open for space for drains to common duct; and Nos. 5 to 9 were tied.

Remarks.—Duration of operation, two hours and twenty minutes. It was tedious and difficult to extract all the stones. Slight bleeding occurred from wall of duct, which stopped when sutures were tied. There was dilatation of hepatic half of common duct, of hepatic duct, and of lower half of cystic duct. No dilatation of duodenal half of common duct. The patient made an uninterrupted recovery.

Sometimes large quantities of gravel are found behind a large obstructing stone. These may occur either as amorphous masses of bilirubin lime and can be identified positively only by chemical tests, or as masses containing hundreds of well-formed minute stones one to three millimetres in diameter. With a low magnifying lens these stones can be recognized as biliary calculi, especially if the broken surface with its characteristic radiations is seen. The importance of identifying as gall-stones concretions passed with the fæces is obvious, as thereby we have a positive clue in tracing the origin of vague symptoms.

I believe it is as yet impossible clinically to differentiate diseases of the gall-tracts caused by stones from those caused by bending or valve-formation of the ducts. This I have shown in a former paper,—viz., “Retention from Displacement, Bending, and Valve-Formation,—Oblique Insertion in Biliary Tract” (*Medical Standard*, Chicago, November and December, 1896, and January, 1897; also *Transactions of the American Surgical Association*, 1896).

We may have either the frequently recurring short attacks of colic, as in floating stone in the common duct, or those monthly or semiannual attacks of colic with inflammation as with stones in the infected gall-bladder, or, finally, no colic at all, icterus, if present, being the only symptom pointing to the biliary tract.

(3) SHOULD THE OPERATION OF CHOLECYSTOSTOMY IN TWO STAGES BE ABANDONED?

Courvoisier's statistics showed the mortality to be the same—namely, 10 per cent.—whether the operation was performed in one or two acts. We read and hear less and less of the two-stage operation being performed now. Many operators have given it up (F. Lange); others pronounce it a bad operation (Halsted, *Bulletin of the Johns Hopkins Hospital*, February, 1897, No. 32); others resort to it only exceptionally, as Kehr in three out of 100 operations ("Ein Rückblick auf 209 Gallensteinlaparotomien," etc., *Langenbeck's Archiv*, Band 53, 1896, Heft 2, p. 362). Riedel is one of a few who holds to it with certain well-defined indications (Penzoldt and Stintzing's "Handbuch der speciellen Therapie. Chirurgie der Gallenwege").

The chief objection to the operation in two stages is that it does not allow of the removal of incarcerated stones from the neck of the gall-bladder or from the ducts. This makes the operation for gall-stones an imperfect one, necessitating perhaps a secondary operation to remove stones which cannot escape by way of the fistula.

Riedel's indication for the operation in two stages is the presence of a small, deep-seated gall-bladder which cannot be brought out and sutured to the parietal peritoneum.

I do not feel like giving up this operation entirely, as it is safer against infection of the peritoneum than the operation in one stage. It protects as certainly and surely when we operate for a suppurating gall-bladder as when we operate for abscess of the liver or any other retroperitoneal collection of infective material. I never had a patient die from the effects of an operation in two stages; in one cholecystostomy in one stage, however, a fatal septic peritonitis followed. It seems to me that when the object of a cholecystostomy is not so much the removal of stones from the biliary tract as drainage of a septic gall-bladder (a temporary operation to avert the danger of rupture, perforation, and sepsis), the two-stage operation is preferable or the only rational one (Riedel).

If we have to operate during an acute attack of cholecystitis and find a small, deeply situated gall-bladder, to which all the surrounding organs—namely, duodenum, transverse colon, stomach, pylorus, etc.—are adherent, or a gall-bladder that is entirely buried beneath succulent and œdematous adhesions to other organs, I prefer to operate in two stages. In some of the most complicated cases—and the cases of disease of the bile-ducts that come to operation at the present time are generally more or less complicated, as seventy-three of Riedel's 120 cases were complicated—the local condition and condition of the patient may necessitate the two-stage operation as the wisest compromise, as the patient may not be able to bear an operation lasting one to three hours.

There is another reason aside from safety that induces me to operate in two stages in some of the most complicated cases,—namely, the simple drainage of the gall-bladder not only relieves symptoms, but brings about a change in the pericystitis whereby the hard, œdematous, infiltrated adhesions become soft and pliable and the organs again become movable. At a later operation, under these circumstances, the isolation of the bile-ducts without rupturing the gall-bladder or intestines becomes possible. We can then recognize the identity of the different structures, which is sometimes impossible in the acute, active stage of the pericystitis.

There are many cases reported where the radical operation had to be abandoned, or where the patient died because the operation was too complicated or the intestines were opened into. I have in several cases of this kind been satisfied to be able to lay bare a square inch of the gall-bladder surface for an operation in two stages. The majority of my cholecystostomies in two stages, although operations of necessity, have given permanent relief.

For the young surgeon who begins to operate on the biliary tract it is better to perform more cholecystostomies in two stages, even at the risk of making incomplete operations, than to venture too far into a more complete operation and

lose the patient. With years of experience his operations will gradually become more and more complete.

(4) ABSCESSES OR FISTULAS.

The greatest difficulties are encountered in the cases where abscesses are located between the biliary and the intestinal tracts with fistulæ between these hollow organs. A localized hard mass in the adhesions indicates the presence of an abscess. As an instance, I cite the following cases of fistula into the pylorus:

CASE II.—*Repeated attacks of biliary colic extending through one year; no icterus at first; after eight months icterus and clay-colored stools. Operation; indurated mass uniting ducts and stomach; found to contain cavity filled with cheesy detritus and a sinus opening into stomach; fistulous opening in stomach sutured. Stone in common duct removed by choledochotomy; cholecystostomy. Recovery; no recurrence of biliary colic.*

Mrs. G., American, aged thirty-five years, housewife; married ten years. One child eight years old and healthy. Two abortions in 1893, both at about the second month.

Family History.—Mother died of measles at forty-eight years. Father died of hæmorrhage from the bowels after suffering with diarrhoea for one week. Sisters,—two died of typhoid fever; another died of a disease in which there were paroxysms of pain, said to be in the region of the gall-bladder. She had no jaundice, but often vomited much greenish fluid, and late in the disease there was total inability to retain food. A fourth sister died at the age of fourteen, cause unknown. Brothers,—three living and healthy.

Previous Illnesses.—Small-pox, spinal meningitis, measles, chicken-pox, mumps during childhood. In later years she had influenza several times. Typhoid fever; vaginal discharge of whitish color. She also sustained a fracture of the arm during childhood.

Present Illness.—In 1890 the patient began to suffer with gaseous distention of the stomach, and she always had to take something to bring relief. Occasionally with this distention there

was the sensation as of a hard lump in the stomach. The distention came on immediately after eating, but did not occur after every meal. It could be traced to no special kind of food. The more severe attacks were accompanied by nausea and vomiting, headache, palpitation, and pain in lower angle of left scapula, also of right. Her general health gradually became more and more impaired as the attacks became more severe. Her vomitus was sour; when the stomach had been full it was not highly colored, whereas if the stomach was empty or the vomiting persisted, it finally became green.

In the winter of 1895 she had a sudden attack of pain in the region of the gall-bladder. It was severe and lancinating and recurred at short intervals. It radiated downward towards the pubes and backward into lower angle of right scapula and into region of both kidneys. From the onset the pain rapidly increased in severity. When subsidence began it did not take long until she was almost free from pain in the region of the gall-bladder. After the attack she felt great "soreness" in the region of the gall-bladder, and also much muscular soreness, especially on left side about the neck, arms, and trunk. This attack was followed in a month by a second exactly similar in character. After this she had one attack about every month, coming on near the menstrual period; most attacks were preceded by nausea and dilatation of the stomach with inability to evacuate the gas. She was free from vomiting during some of the attacks. Each attack left her in a very weakened condition. Stools between the attacks were said to be more or less clay-colored, but at the time of attacks and immediately after they were greenish and dark. Jaundice first occurred in April, 1896, after she had had about twelve attacks. Physical exercise brought on a paroxysm.

Operation.—July 22, 1896; Mercy Hospital; patient intensely icteric; ether narcosis.

Incision along outer border of right rectus muscle, from costal arch; at first four inches, later extended to six inches. Hæmorrhage was quite profuse from the abdominal wound. Peritoneum was sutured to the skin. Peritoneum presented a normal aspect. Liver normal in appearance and consistency. Extensive adhesions between liver and gall-bladder and pylorus, colon, and duodenum. Head of pancreas was normal. The

omentum which covered the gall-bladder was divided bluntly and the organ freely disclosed. It was found tensely distended with fluid. The portion of omentum between the liver, pylorus, duodenum, and gall-bladder was examined. In the region of the pylorus, which lay about two inches to the inner side of the gall-bladder, an indurated area was discovered. It was thought that this might indicate an attempt at spontaneous rupture of a stone into the gastro-intestinal canal.

The adhesions between the pylorus and gall-bladder were now loosened by blunt dissection. The indurated area, which extended up close to the liver, was opened during the process of separating the adhesions. It was found to contain a central cavity divided into two or three pockets by partial septa. The contents were thick, granular, cheesy masses which were of a dark-green color. The material was removed with a sharp spoon. After searching the cavity for some time with a probe a sinus was discovered leading into the stomach. The masses of adherent omentum binding the pylorus to the colon and duodenum were now clamped, divided, and ligated, and the pylorus was thus set free.

The sinus leading into the stomach was closed by sutures, as was also the cavity in the indurated mass. Large gauze sponges were now packed around the fundus of gall-bladder and the latter incised. About two ounces of a dark-green, glairy fluid were evacuated. The liver was held up and to the right and the intestines were retracted to the left and search was made for the common duct. A stone was felt in the common duct; it was freely movable and readily slipped away from my grasp. It was held firmly in place, a small incision made over it, and the stone removed, which presented two facets. Exploration with my flexible probe failed to reveal any more calculi. Bile in large amounts escaped through the incision, but was kept sponged away. A small vein was cut inadvertently and ligated.

The common duct was sutured with fine silk. First mucosa and muscularis, then a Lembert suture over all. A loop of silk was passed through the gall-bladder and the latter opened. Two stones similar to the one found in the common duct were removed. Palpation and the use of probe failed to reveal any more stones. The wall of gall-bladder was thick, three to five millimetres. The edges of the wound in the gall-bladder were sutured

to the skin. A gauze drain was passed down to the pylorus. A rubber drainage-tube together with gauze drain was passed down to the wound in the common duct. A rubber drainage-tube was inserted into gall-bladder. Abdominal wound sutured after removing sponges and toilet of peritoneum.

Time of operation, two hours.

The jaundice disappeared in time, and the stools were again bile-stained, although large amounts of bile escaped through the fistula. She soon began to gain in weight, and had no more attacks of pain.

In another instance a pericystic abscess between the gall-bladder and the transverse colon terminated in a faecal fistula, one month after a cholecystostomy in two stages. In this case the gall-bladder was buried among the adjacent intestines. Would it have been better to have laid the bile-ducts bare and sutured the colon at the first operation? If this had been done, would the patient be alive to-day?

(5) DISPLACEMENT OF THE GALL-BLADDER AND OF THE ENTIRE LIVER.

This, I found, in two cases, to be due to very firm adhesions to the parietal wall. Lateral displacement will necessitate a transverse branch to the longitudinal incision. Displacement upward under the costal arch may require resection of the costal cartilages as proposed by F. Lange.

An instance of this is the following case:

CASE III.—*Biliary colic for ten years. At first without jaundice or clay-colored stools. August, 1897, severe biliary colic with jaundice and clay-colored stools. Operation: liver and gall-bladder retracted high up under ribs requiring resection of costal cartilages to bring gall-bladder in view. Very extensive adhesions everywhere; operation in two stages; gall-bladder with difficulty sutured to peritoneum; gall-bladder opened thirteen days later; stones escaped; fistula for some months; eventually recovered; no more colic.*

C. D. C., male, aged forty-seven years; physician: American.
Family History.—Mother died of pneumonia at age of fifty-

eight. Father living and healthy. Sisters,—one living and healthy. Brothers,—none. Maternal grandmother died at age of forty-six years of carcinoma of breast and liver. Maternal grandfather died at eighty-seven. Maternal aunts,—one living and healthy. Maternal uncles,—two living and healthy. Paternal grandfather died at sixty-two of pneumonia. Paternal aunts,—one died at age of sixty-two years of mammary carcinoma.

Previous Illnesses.—Scabies, small-pox, scarlet fever, measles, diphtheria, and typhoid fever during childhood. During his boyhood he had an illness accompanied by hæmorrhage from the bowels. Since the age of twenty-five years he has had several attacks of rheumatism. Morphine habit established about 1883. Stopped the use of the drug in 1895 and 1896, but began it again in January, 1897, because of chronic diarrhœa following its discontinuance. Uses alcohol to excess. About two or three times a year he goes on a spree for two or three weeks. Chews and smokes moderately. Is irregular in eating and sleeping. He sustained a Colles's fracture, right side, in 1891.

Present Illness.—For ten years previous to July, 1897, he suffered with recurrent attacks of pain in the region of the gall-bladder. These came on suddenly without apparent cause. He was usually seized with them while riding in his buggy, and often had to stop driving because the jarring increased the pain. In the beginning the attacks lasted for a few moments only, but the duration increased with time. He says the pain felt as though a blunt instrument were being forced from without inward and upward beneath the right costal arch towards the gall-bladder. Sometimes the pain was lancinating, radiating around towards the spinal column. The pain usually subsided suddenly, but sometimes it went away gradually. He himself, however, shortened some attacks by inhaling chloroform and taking opiates. In the last two or three years he has had three or four attacks lasting one-half to three-quarters of an hour. During this period of ten years of recurrent attacks he never noticed that they occurred with any regularity nor followed any error in diet,—unless eating onions might have had an influence. Bowels were neither constipated nor loose. Color of stool never abnormal. There was occasional distention of the stomach during the attacks. No nausea nor vomiting. No jaundice at any time. No

stones ever found in the fæces. No tumor ever felt in region of gall-bladder.

His first very severe attack came on, very suddenly, July 18, 1897. The pain was localized in region of gall-bladder, being extremely severe with lancinating exacerbations. Respiration and all movements increased the pain. The pain reached its height in three or four minutes and was not relieved by a grain or two of morphine. During his second hour of pain he was anæsthetized with chloroform. When he awoke, after an hour, he was still in pain, but by taking short breaths he felt fairly comfortable and continued so for one week following. Temperature at the time was high, 104.5° F. The stools were markedly clay-colored throughout the week. No jaundice yet. Tenderness and rigidity over region of gall-bladder. At the end of another week he began to sit up and soon to move about. The pain, however, was still present and was excited by deep inspiration and jarring of the body. Jaundice appeared August 9, lasting three or four days. Sclerotics and skin yellow, urine very dark colored; stools very light colored. The pain above described lasted in mild form for ten weeks, gradually wearing away; as it did so it shifted its position towards the right axillary region on same level. In August he had a mild attack, lasting one hour; temperature 102°; pain left suddenly. During the latter part of September he was seized with another attack of pain similar to former, only less severe. Subsided suddenly after two hours; no jaundice nor clay-colored stools.

Operation.—Ether narcosis at first; later changed to chloroform as the bronchial secretion was very profuse and he took the ether badly.

Longitudinal incision, nine or ten inches long, along the outer border of the right rectus muscle, beginning at costal arch. Peritoneum sutured to skin. Omentum and intestines found very much adherent everywhere in gall-bladder region. Palpation of liver and gall-bladder showed that they were located high up under the ribs, firmly adherent, and surrounded everywhere by adhesions. In order to bring these organs in the field of operation, four inches of the two lowest costal cartilages were resected. Now the hand was again introduced into the hypochondrium and the adhesions were with great difficulty loosened and the liver and gall-bladder brought into the wound.

The gall-bladder was somewhat distended, dark purple in color, its surface rough and ragged, due to broken-up adhesions. On palpation a hardened mass was felt in the gall-bladder. It could not be moved, and its consistency was suggestive of carcinoma. Aspirating needle drew out dark-green bile; needle struck against a stone. Wall of gall-bladder very friable.

The fundus of gall-bladder was now sutured to the parietal peritoneum in upper angle of wound. Some of the sutures at first tore out on account of the friability of the gall-bladder. Stitches included serosa and muscularis.

Gauze drain inserted between gall-bladder and abdomen wall, in upper angle of wound; another gauze drain from lower angle of wound. Remainder of incision sutured with interrupted silk sutures. When completed one could see in the upper third of the wound about one square inch of the fundus of the gall-bladder exposed. A guide suture had been placed in its centre and the ends left long. This opening in the abdominal wall down to the gall-bladder was packed with sterilized gauze and dressing applied.

Second Stage of Operation.—After thirteen days. Narcosis, first chloroform and then ether. Gauze packing removed from gall-bladder, and guided by the suture the fundus was incised with Paquelin's cautery. Very small amount of bile escaped. Finger and metallic probe introduced and many stones felt. Stones were removed with forceps and spoon. Some had to be crushed to facilitate removal.

The cystic duct could not be located by probing. A rubber drainage-tube, one-third to one-half inch in diameter, inserted into gall-bladder and stitched in place. Wound packed and dressed. A number of stones escaped during subsequent dressings. Fistula continued open for some months thereafter, and stones and bile were discharged. Eventually no more stones came away and fistula healed up.

Patient has had no attacks of biliary colic since, and is well to-day.

(6) IN WHAT CASES SHOULD WE OPERATE AND WHEN?

In what cases should we operate and when are questions concerning which there exists a difference of opinion between internal medicine and surgery. Operation is now per-

formed earlier in the disease than formerly, when only the most desperate cases sought surgical aid. The local conditions, which tend to make operation difficult if not impossible, are due to the recurrent attacks of infection and inflammation in and about the gall-bladder. In Kehr's 209 operations, forty-one lasted more than two hours, six more than three hours, and two over four hours,—in other words, 24 per cent. lasted over two hours. In the early operation less complications are liable to be encountered and the operation is consequently shorter, and for this reason should be advocated. It is questionable, however, if the cases that present the greatest difficulties during operation always present a history pointing to the same or, indeed, have a history that indicates early operation.

In cases with remittent attacks I prefer to operate in the interval of rest, as in appendicitis. I do so because I believe the adhesions are less rigid and œdematous and the microbes less active in the free interval.

When stones are being passed with the fæces, whether through a dilated Vater's diverticulum or through a perforation into the intestine, we naturally await the result, and see if relief does not follow. This is evidenced by the following case:

CASE IV.—*Biliary colic for four years; icterus two years ago; stone found in the fæces; recurrence at least once or twice every month; during last year attacks almost every week; sometimes very severe; icterus; late in December, 1896, severe biliary colic, on which day stones were found in fæces; in all six stones were passed. Spontaneous recovery without operation. No attacks since.*

F. R., male, aged sixty years. In 1879 had typhoid fever, and was ill for about one year afterwards with gastric symptoms; no icterus; he finally recovered from this attack. Afterwards, however, he frequently suffered with heaviness in gastric region, but could eat anything without particular discomfort. In 1890 had an attack of "la grippe," and again in 1891. In February, 1893, had an attack characterized by sudden dizziness, vomiting, no pain nor symptoms pointing to the gall-bladder. Later, in

1893, he had attacks of "cramps in the stomach," with chills and vomiting, coming on suddenly, and lasting three or four hours, diarrhœa at times. In 1894 attacks recurred once or twice in every month,—pain, chills, vomiting, fever (101° F.), was confined to his bed for one or two days. In spring of 1894 icterus of slight degree; urine dark; but stools not clay-colored. He went to Carlsbad in July, 1894; after one of the attacks there two stones with seven facets were found in the fæces. Returned home the same fall, and in December, 1894, had a severe paroxysm accompanied by icterus.

In 1895 he had an attack every three or four weeks, was icteric, but had no clay-colored stools. Went to Carlsbad again and had three or four attacks there. Left Carlsbad in August, and until the latter part of the year had no more attacks. He gained fourteen pounds during this time. December 24, 1895, however, he had a severe attack with great pain, chill, and icterus. In 1896 the attacks began to recur with increasing frequency, even once every week. Went to Carlsbad again, where he had an attack about once every week. He was very icteric and had clay-colored stools. Returned home in August, 1896, and continued to have attacks about every week. Also had herpes zoster on right side. From December 11 the attacks began to recur every day. He was jaundiced, but stools were said to be dark green. Severe paroxysm December 19, lasting about fourteen hours,—fever 101° F. December 22, severe attack again. December 24, severe pain and stone passed,—weight twenty-two grains, seven facets. December 26 and 27, slight pain only and no stones passed. December 28, four stones passed, weighing respectively forty-seven, four, three, and one and three-quarter grains. December 29 a large stone passed, weighing fifty-eight grains.

I had been called to see this case for the purpose of operating. I arrived just at the time the stones were beginning to pass, and decided to defer the operation on this account. No operation was performed, nor has there ever been an indication for operation since the last stone passed away, December 29, 1896.

(7) REMOVAL OF CALCULI.

In choledocholithotomy it is important to find and remove all of the stones, as a stone being left may necessitate

a second operation. Kehr was unable to find all the stones in five out of thirty cases (16.6 per cent.). I was unable to find a small stone in Vater's diverticulum, and Küster, Terrier, Lauenstein, and Riedel, according to Kehr, each report one case. Where do these stones hide, even sometimes after they have once been felt at first? When they do not slip up into a dilated hepatic duct, where may they be felt with the finger or probe? I believe that they hide in diverticula in the wall of the ducts.

As an aid in detecting stones, after the common duct has been opened, I devised my flexible metallic probe, made of spiral wire, as described in my paper of 1896 (*Medical Standard*). Not only is a click felt when the probe strikes a biliary calculus, but, what I consider of much greater importance, should the point of the probe glide past a calculus, half hidden, we will say, in a diverticulum, we feel a grating sensation caused by contact of the stone and the uneven surface of the probe. I believe that I might have been thus able to feel the small stone in Vater's diverticulum, which remained undiscovered, and might perhaps have saved my patient.

(8) WOUND IN THE COMMON DUCT.

The wound in the common duct is always closed with sutures; or, as Kehr terms it, the choledochotomy operation is always the ideal one. It is difficult to insert the sutures in the common duct, located, as it is, at the very bottom of the deep field of operation. Halsted has devised a hammer to facilitate the introduction of sutures.

(9) PROGNOSIS.

The prognosis of choledochotomy, as of operations on the ducts in general, is improving. In 1896 I estimated the mortality of the forty-four cases then reported in the literature, and found it to be 18 per cent. I have operated on seven cases with one death,—14.3 per cent. In Kehr's thirty cases there was a mortality of 6.6 per cent. only; this is an exceptionally favorable record that will probably not be ob-

tained by the majority of operators, nor be improved by a larger series of cases.

(10) OF THE CASES DEMANDING OPERATION ON THE
BILIARY TRACT, WHICH ARE EASY AND WHICH
ARE DIFFICULT OF OPERATION?

It is notable that the two operators who have had the most extensive personal experience in this field of surgery should have such diverging opinions. Riedel (page 106) has greater fear of the cystic duct than of the common duct. Kehr, however, performed twenty-three cysticotomies without encountering complications or having a death, whereas he found his thirty choledochotomies mostly difficult and complicated. The explanation is that the number of operations is yet too small to avoid drawing erroneous conclusions.

In my opinion, the difficulty in operating on the ducts increases as we approach the duodenum, but conditions aside from the location of the disease must also be considered. Some of these are, for example, adhesions, fistulæ, abscesses, bends and valve-formation, retracted inaccessible location of the gall-bladder, etc. The former may complicate the disease in any part of the tract to such an extent as to render the aspect of the case extremely grave and the operation highly dangerous, if not impossible.

OPERATIVE WOUNDS OF THE THORACIC DUCT.
REPORT OF A CASE WITH SUTURE OF
THE DUCT.¹

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WOUNDS of the thoracic duct in the standard text-books of surgery are given but the most cursory mention. König makes none, and Tillman but the barest reference to them. Treves¹ says, "In every case death must follow (in a period of weeks rather than of months) from marasmus, consequent upon the discharge. The treatment is purely symptomatic." The American view is much the same, and the subject is dismissed with such statements as "a wound of the thoracic duct is beyond surgical treatment."

Such meagre notice may be explained by the fact that wounds from external agencies are practically unknown. The near neighborhood of vital structures, injury of which would be rapidly fatal and so lesion of the duct be unheeded, probably accounts for this.

The main part of the duct lies in a surgically forbidden region of the body. In the neck alone and there only, under unusual circumstances, is it accessible.

Accidental injury of the thoracic duct or its large branches during operative procedures, on the left side of the neck, is fortunately an uncommon occurrence. The duct, under ordinary anatomical conditions, does not rise above the level of the junction of the two great veins, and routine dissections, till recently, have not carried the operator to this corner of the supraclavicular triangle.

At this hospital to-day operations for carcinoma of the breast are almost invariably extended above the clavicle,

¹ Read before the Johns Hopkins Medical Society, March 20, 1898.

where glandular involvement, though not previously palpable, is found in a large number of cases. During this dissection the angle between the veins is usually exposed and the contents of the triangle excised as far back as the trapezius. Since this routine supraclavicular operation has been introduced, of the sixty cases so treated thirty-five have been on the left side of the neck, and in only two has the duct or one of its large branches been injured. One of these was not recognized till the subsequent formation of a chylous sinus.

In no case of dissection for tuberculosis or other glandular disease of the neck, though often followed into this region, has any such injury been noted. Possibly in these cases, as the dissection is carried downward and towards the angle and a ligature usually passed about the pedicle of the last gland, open division of a large branch may be frequently averted.

It has been possible to collect from the literature seven fairly authentic cases of operative injury to the duct or to a branch near enough to the main trunk to lead to a discharge of chyle. Summaries of these will be given. To this number the following two are added from the surgical records of the Johns Hopkins Hospital:

Professor Halsted, during an extensive operation for breast carcinoma, in 1895, divided presumably a large branch of the duct. The history of the case in brief is as follows:

CASE I.—Surgical No. 4775. Mrs. H. B., aged sixty-six years, first noticed a growth in the left breast four months before admission. The tumor occupied the inner and upper quadrant. There were many small, shot-like, tender glands in the axilla. No glands were palpable above the clavicle. There was one lenticular skin metastasis. The tumor itself did not involve the skin. Operation November 5, 1895. Complete excision of breast, pectoral muscles, and contents of axilla and supraclavicular triangle. The wounds were closed without drainage, leaving an exposed area for skin-grafting.

November 10: First dressing; wound apparently healed *per primam*. There has been no particular elevation of temperature and no subjective symptoms following the operation.



Sketch showing position of the duct and site of the injury.

November 15: Second dressing. A slight fulness was noted in the left supraclavicular region. The cicatrix was opened at one point, and about four or five ounces of a milky fluid escaped. Gauze drain inserted. Patient's weight 107 pounds.

November 23: For eight days there has been a profuse discharge of milky fluid from the wound. The wound was explored on this day, and the discharge seemed to come from about the level of the stump of the omo-hyoid muscle overlying the jugular vein; gauze packing was introduced to this point. Patient has lost ten pounds in weight.

December 9: No discharge since gauze packing, on November 23. Patient has gained twenty-three pounds; wound about healed.

The subsequent history is without note. She died June, 1896, presumably of internal metastasis. No post mortem allowed.

The following is the history of the writer's case:

CASE II.—Surgical No. 7454. Mrs. B., aged sixty-two years, was admitted in December, 1897, for carcinoma of the left breast. The growth was small and of three months' standing. Axillary glands involved. No glands palpable in the neck. At the operation pectoral muscles and axillary contents were thoroughly cleaned away. The prognosis was considered most favorable. The apex fat and that in the subscapular region showed no involvement and the supraclavicular region was not explored. The wound was partly closed and an immediate skin-graft placed over the denuded area. The wound healed *per primam*.

Two months later the patient returned for examination, and a small gland was palpable over the clavicle. She was readmitted and operated on the following day.

Operation February 25, 1898. Skin incision from near mastoid to clavicular articulation and out along the clavicle to the coracoid (*cf.* sketch). The skin-flap with platysma was dissected back. The clavicular attachment of the sterno-mastoid was divided and the muscle turned forward. The subclavian and jugular veins were then exposed and the removal of the contents of the triangle begun at their junction. The dissection had been carried back to the brachial plexus, when, on relaxing, the tissues there stood into prominence, a thin-walled, colorless vessel

overlying the scalenus muscle. It was about the size of a straw, and hardly visible when collapsed. About three centimetres had been laid bare, and it was strange that it had not been completely divided. As it was, a small opening had been made in it, about one centimetre above the subclavian vein, into which it appeared to enter a short distance from the jugular. The vessel arched up into the neck for about four centimetres and disappeared into the tissues behind the jugular. A large branch, about the size of the usual silver probe, entered into this vessel just below the point of injury and disappeared behind the subclavian about two centimetres to the left of the main duct. The wound in the duct was fortunately a longitudinal one, and only about three millimetres long, but there escaped from it intermittently a clear serous fluid, sufficient in amount to flood this corner of the wound as fast as it could be sponged away.

The leakage was controlled by the pressure of gauze, while the rest of the dissection was completed as far back as the trapezius. With a delicate, curved French¹ needle a longitudinal bit of the wall on each side of the opening was picked up and a fine black silk suture passed and tied, inverting the edges of the opening. There was no further leakage, and the patency of the duct remained apparently intact. The wound was closed, as usual, with silver wire, without drainage, and the neck immobilized in a plaster-of-Paris dressing. The accompanying drawing is from a sketch made immediately after the operation.

The patient made an uninterrupted recovery. The healing was by primary union. There was no filling up of the triangle, nor induration indicative of the escape of lymph under the flap or into the tissues.

As far as the writer knows, this is the first case of wound of the duct which has not been followed by subsequent leakage. In but two other cases, Keen's and Porter's, has an attempt been made to close the opening by suture. In Dr. Porter's case the suture was presumably successful, an injured radicle being responsible for the subsequent discharge.

¹ The fine curved needles with a patent eye, obtained by Dr. Halsted from Luer, are invaluable in delicate work of this sort. The writer has recently been able to close an opening one centimetre long in the axillary vein by three mattress sutures, and to close a hole in Steno's duct, which had been wounded while removing an accessory parotid tumor from the cheek.

Following are the summaries of the other seven collected cases in which the main duct has been injured or a branch sufficiently near it to allow of the escape of chyle.

CASE III.—D. W. Cheever (*Boston Medical and Surgical Journal*, 1875, p. 422). During an operation for the removal of a tumor from the left side of the neck the subclavian vein and thoracic duct were wounded. A large amount of coagulated and colorless fluid escaped with the blood. The large veins were ligated without stopping the escape of the fluid. The wound was packed with gauze. Death from shock occurred in a few hours.

CASE IV.—Boegehold ("Ueber die Verletzungen des Ductus thoracicus," *Archiv für klinische Chirurgie*, 1883, Vol. xxix, p. 443). Wilms, in 1880, during an attempt to remove a large carcinoma from the left side of the neck of a stout man, was working near the angle of the large veins with a sharp spoon. There suddenly appeared in the wound a stream of milky fluid the diameter of a straw. The operation was abandoned, the wound packed. There was no further leakage. The patient recovered to die subsequently of internal metastasis.

CASE V.—Theo. Vagades ("Ueber die Verletzungen des Ductus thoracicus," Inaugural Dissertation, Würzburg, 1885). Maas, after the extirpation of a large round-celled sarcoma of the parotid region and while clearing out a chain of glands, which extended down the neck, wounded the subclavian vein. The wound was packed with gauze and partly closed. There was a profuse discharge, with a particularly sweet smell from the dressings for the next six days. On the sixth day a stream of white coagulable fluid was found to come from the bottom of the wound, and supposedly from the thoracic duct. The wound was successfully tamponed; no further leakage resulted, and the patient recovered.

CASE VI.—A. M. Phelps (June 4, 1893, quoted by Dr. Keen), while attacking a malignant tumor, which involved the left jugular vein, found it necessary to remove three inches of the lower part of this vessel. Following the operation, there was a constant profuse discharge of a milky fluid from a single point in the wound; quantity estimated at three pints a day. The patient was rapidly losing flesh. On the seventh day a clamp was placed on the point of evacuation and allowed to

remain three days. No further leakage. The patient made an excellent recovery.

CASE VII.—W. W. Keen ("Operation Wounds of the Thoracic Duct in the Neck," *ANNALS OF SURGERY*, 1894, Vol. xx, p. 87). Dr. Keen had exposed both veins, nearly to their junction, during an operation for tuberculous adenitis of the neck. On dividing what was supposed to be an adhesion there welled into the wound a limpid, coagulable fluid, which flowed rhythmically from a tear one-fourth inch long in a tube about one-eighth inch in diameter. After the dissection was completed a suture of fine silk was placed through the wound in the duct, which partially controlled the leakage. The wound was drained. There was an abundant discharge of a light colorless fluid, estimated at a pint, for a few hours, after which the wound remained dry and the patient recovered without further incident.

CASE VIII.—J. Schwimm ("Case of Operative Injury to the Thoracic Duct at the Root of the Neck," *ANNALS OF SURGERY*, 1896, Vol. xxiii, p. 582). On December 15, 1895, a patient was operated on for tuberculous glands of the neck, the lowest glands, just above the sternal end of the clavicle, having been enucleated with the finger. The wound was closed and the skin incision healed. On the twelfth day a fluctuating swelling had appeared at the site of the incision. This was opened and a few ounces of a milky fluid escaped. This discharge continued and became profuse, estimated at one and a half to two pints in the twenty-four hours. Efforts to control the leakage by gauze packing were fruitless. The patient became weak and emaciated. The wound was reopened and a small vessel, the size of a knitting-needle, found and clamped. There was cessation of leakage and immediate relief of symptoms. Recovery was complete.

CASE IX.—(Personal communication). Dr. C. A. Porter, while doing an extensive operation for the removal of axillary and cervical tuberculous glands at the Massachusetts General Hospital in December, 1897, opened the thoracic duct during the removal of a small gland from the bottom of the wound. The wound in the duct was about one-half inch above its entrance into the subclavian vein. From the opening a clear, yellowish fluid escaped, amounting to a drachm or two in ten minutes. No other ducts were evident. It was apparently the main duct. The valves at the orifice were evident and competent most of the time, but occasionally a few drops of blood

would escape backward into the duct during respiratory changes. Three fine Lembert sutures, as in intestinal suture, were passed, stopping the flow, though some lymph escaped, presumably from another torn vessel, which might have accounted for the subsequent discharge. The wound was opened on the second day as it had filled up with serum. It continued to discharge for fifteen days a small amount of serum, but without serious symptoms. Recovery eventually was complete.

From a review of these cases, it is evident that the nature and seat of the injury were, as a rule, most uncertain. Cases I and VII concern presumably small branches of the duct; in each an injury was unsuspected. The external wound healed *per primam*, to break down on the tenth day, and lead to a chylous fistula, which threatened starvation. An increase in diet, the removal of the dressing, allowing greater freedom of motion of the neck, or perhaps some constriction on the proximal part of the duct, causing back pressure into some injured radicle, may have been responsible for the escape, at this late time, of chyle into the wound. In Cases III, IV, and VI there were associated gross injuries of the large vessels with lesion probably of the duct itself. Recovery followed in the two latter cases, in one after a tampon and in the other after clamping the vessel. In Case IV (Boegehold) there was an undoubted lesion of the duct and recovery followed. The fluid which poured out into the wound at operation was milky. The patient evidently had had his breakfast. In Dr. Keen's (Case VII), Porter's (Case IX), and the writer's case (Case II) the duct was identified and sutured. The contents, however, were colorless, as the lacteals had been kept inactive for many hours.

The anatomical situation of the terminus of the duct in the neck presents great variation.² Presumably under ordinary circumstances, in which but a single large trunk arches over the apex of the pleura to enter into the posterior part of the angle of union of the great veins not reaching above their level, it lies beyond the reach of operative injury.

Most important, from a surgical stand-point, are the anomalies of the cervical part of the duct which carry it high

into the neck, as in the writer's case. It has been found by Dieterich in one case to ascend as high as five and a half centimetres above the top of the sternum.

The presence of this high arch may, perhaps, be not uncommon. A drawing accompanying Dr. Porter's notes shows this same condition, and the writer recently, during a complete breast operation, exposed by blunt dissection a duct, which occupied a position the counterpart of that shown in the accompanying sketch. Important also are those cases of multiple endings in which it forms a delta, the branches of which pass in various directions into the great veins. One or more of these branches, of course, could be injured and ligated without harm, but such a condition, unfortunately, from a surgical stand-point is rare.

The consequences of division or obstruction of the single main trunk of the duct, as learned from both pathological and experimental resources, will be briefly referred to here, as they seriously concern us in the treatment of accidental injuries.

Experimental ligation in those animals which have but a single duct seems to be followed, if not by immediate rupture of the receptaculum chyli, at all events by lesions which are soon fatal. Sir Astley Cooper³ first demonstrated this, and in fact produced rupture by simple digital compression on the duct during digestion. Death supervenes on rupture in consequence of visceral compression from the extravasated fluid or due to starvation, provided some external means of exit is allowed for the chyle. These experiments have been confined chiefly to dogs, as in these animals anomalies of the duct are supposed to be rare. That rupture of the receptaculum does not follow in all animals, experiments upon horses by Flandrin, Magendie, and Dupuy⁴ have demonstrated. Rupture of the duct in human beings, as a result of traumatism or following upon diseased conditions, such as tuberculosis,⁵ produces lesions the counterpart of those secondary to experimental rupture in dogs. Kirchner⁶ collected and carefully reviewed all of these cases which had been reported prior to 1885.

Experimental division of the duct in dogs is in a similar way rapidly fatal. Boegehold's dogs, in which the duct had been severed and the external wound closed, died in a few days from respiratory and cardiac compression.

Occlusion of the duct, without serious symptoms, seems, however, to occur only in those cases in which the process may have been of slow formation, as from the pressure of tumors or the involvement in some new growth, tuberculous deposit or chronic inflammatory change. These cases are naturally more favorable to a readjustment of collateral circulation. The terminals of the lymphatic system are represented by mere spaces without definite walls, and through them the lymph-current, under certain circumstances, may be reversed and finally all be taken up by the right thoracic duct. Under these conditions of gradual obstruction, however, great lymphatic tumors of beaded and dilated vessels, especially in and about the abdominal cavity, may be found. Such a readjustment may, however, have been partially formed, and yet a sudden occlusion lead to rupture and to death. Coyley⁷ reports a case of fatal rupture of the receptaculum, which had occurred suddenly, due to the formation of a thrombus with occlusion of an already greatly narrowed duct, the narrowing having previously led to some compensatory dilatation of the proximal part of the canal. The walls of these thin lymph varices, when once formed, are liable from time to time to rupture with the escape of chyle, producing, according to the site of rupture, chylous ascites, chylothorax, chyluria, or chylous diarrhœa. Bertrand Dawson⁸ has written most interestingly upon these sequelæ, not only of actual thoracic duct obstruction, but of thrombosis of the veins of the neck, morbus cordis, filariasis, and their association with this pathological condition of lymph varix. He says, "In the face of the foregoing observations, both clinical and pathological, the conclusion is on the whole irresistible that a causal relationship exists between thoracic duct obstruction and chylous effusions."

From this brief review of the clinical and experimental results of thoracic duct division and obstruction we may

formulate a more rational course of treatment after injury to the duct has occurred.

In the first place, when working near the duct, all visible lymphatic vessels should be tied. Those which may be large enough and near enough to the main duct to subsequently allow of an escape of chyle might have no apparent leakage during the operation, as under ordinary operative conditions the milky product of the lacteals is absent from the lymph stream. If the duct itself is injured, suture is the ideal method, but must be confined to those fortunate cases in which the duct is fully exposed and has not been completely divided. If suture is impossible and the wounded vessel is a large one, it is safest to treat it as though it were the main and only channel. It would seem advisable to place a provisional ligature about the duct on the proximal side of the wound, and to control the leakage, if possible, by a gauze tampon. This would act as a safety-valve, and allow chyle to escape, if the pressure in the duct became too great and there was difficulty in establishing a collateral lymphatic circulation. The patient meanwhile should be given a meagre diet. If the leakage should become uncontrollable and threaten starvation, the provisional ligature should be tied, with the hope of a final readjustment of collateral circulation or trusting in the presence of some anomalous anastomotic branch which might suffice to carry the lymph into the venous circulation.

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⁵ W. Whitt: "Chylous Ascites," British Medical Journal, 1885, Vol. i, p. 1089.

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⁷ Coyley: Transactions of the Pathological Society, London, xvii, p. 163.

⁸ B. Dawson: "Twentieth Century Practice of Medicine," 1895, Vol. iv, p. 650.

SUCCESSFUL RESECTION OF THE ILEO-CÆCAL COIL FOR CARCINOMA.

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THE following case is reported because of the small number of similar cases on record, and also because of the fact that the conditions for operation were so favorable as to make it a case eminently suitable for surgical measures. The neoplasm evidently began in the walls of the bowel, and remained confined to the cæcum without contracting adhesions to the surrounding parts.

The case is remarkable because of the very slight constitutional trouble following the operation, and the rapid convalescence of the patient. A letter received from the patient a few days ago says that his weight is greater than at any previous period in his life.

Mr. L. H. B., aged fifty-six years; clergyman; married. Until August, 1897, had always been in good health. At this time, after eating some green corn, he was seized with pain in the abdomen, vomiting, and other symptoms of intestinal obstruction. This attack soon passed away, but was followed by another in a few weeks. The second attack also followed the ingestion of corn.

Subsequently, the pain became localized to the right iliac region, and a lump could be made out there. The patient says that he would be painfully conscious of the stoppage of gas at that point, but that, in a few minutes, the gas would pass the apparent obstruction and he would be relieved.

I first saw him January 21, 1898, at Christ's Hospital. He was emaciated, having lost forty pounds since the preceding August, his color was bad (brownish yellow), and his strength much diminished.

Physical examination revealed a hard, freely movable mass in the right iliac region. By manipulation it could be moved in any direction without causing pain to the patient. It seemed to be about the size of a hen's egg. While examining the patient a curious phenomenon occurred,—the tumor seemed to enlarge quickly and the hard lump mentioned above became obscured. The enlargement became so great as to visibly raise the abdomen on the right side, and was accompanied by considerable pain. While examining the enlargement it suddenly disappeared with an audible, high-pitched sound, such as would be produced by forcing imprisoned air through a small opening. The subsidence of the tumor was followed by very evident relief to the patient.

Rectal examination was negative, as was also an examination of the urine.

Because of the fact that the hard mass was so freely movable, I hesitated as to diagnosis between carcinoma of the cæcum and an enterolith. The clinical picture was certainly that of carcinoma, but the history of having swallowed a plum-seed during the previous year and the extreme mobility of the mass led me to consider the possibility of an enterolith.

His daughter, a physician, was told the facts in the case and a laparotomy was advised. The patient's consent was easily obtained, as he was clamorous for an operation.

On January 26, 1898, an incision was made in the right linea semilunaris. The mass was lifted up out of the abdominal cavity, and the fact of its being a carcinoma plainly established. The small intestine above the cæcum was very much distended, while the large intestine was collapsed. The entire cæcum was a mass of carcinoma, the vermiform appendix not being involved. The lumen of the cæcum was reduced to about the size of a lead-pencil. This condition explained the mechanism of the curious phenomenon above referred to,—the intestinal gas would accumulate in the small bowel just above the cæcum, and it would become distended until its pressure became great enough to force its way through the cæcum into the large intestine, its passage through this constricted portion giving rise to the high-

pitched sound. The cæcum was not adherent to the surrounding parts. The mesenteric glands gave plain evidence of infection, and this was wide-spread.

The choice of operation was between the establishment of an artificial anus in the lower part of the ileum, and a resection of the cæcum with an anastomosis of the divided ends. The latter seemed the wiser course to pursue, so ligatures of gauze were passed through the mesentery and tied around the bowel above and below the cæcum. In order to have the ends of about equal diameter, the small intestine was ligated about four inches above the cæcum and the large intestine about two inches below it. Section of the intestines was then made with scissors and the mesentery cut away. After tying off the vessels, a running suture was inserted into each end of the bowel, the two halves of a large Murphy button were inserted and then pressed together. A few Lembert sutures were inserted along the line of union, the bowel was dropped back into the abdominal cavity and the parietal wound tightly closed with silkworm-gut sutures. The dressings were applied and the patient put to bed in a fairly good condition.

For the first three or four days following the operation he was allowed nothing but buttermilk and beef tea. Oysters raw, cream, and cornmeal gruel were gradually added to his dietary. The highest temperature following the operation was 99.4° F., and he rapidly convalesced. The button passed on the thirteenth day, and he was allowed to assume the sitting position on the fourteenth day.

He received one dose of morphine (one-fourth grain) hypodermically, the night of the day of operation. His bowels were moved daily by simple enemata.

It seems to me that much of the safety in this operation lay in the fact that we were able to bring the portion of bowel operated upon outside the abdomen, and thus make the operation practically an extraperitoneal one.

February 8, 1898. The patient's appearance is very much improved, his complexion is better, and he seems actually to have gained in weight. He was allowed ordinary diet to-day.

So far as I know, this is the first case in Cincinnati in which the cæcum has been removed.

The following pathological report is made by Dr. H. J.

Whitacre, to whom I sent the specimen for microscopical examination:

"The hardened specimen received by me was the cæcal portion of the intestine, including two and a half centimetres of normal large intestine, five centimetres of much dilated, yet apparently normal small intestine, and the vermiform appendix nine centimetres in length. In the region of the ileo-cæcal valve there is a distinct ovoid tumor six and a half centimetres long and three centimetres in its greatest diameter. On the mesenteric border of the intestine there are three enlarged mesenteric glands.

"A specimen for microscopical examination was taken from the centre of the tumor mass, extending from the surface into the cavity of the intestine, and representing a thickness of one centimetre. Sections were made to include this thickness. In the mucosa the perpendicular glands are well preserved in their outline, but their cells are in a condition of colloid degeneration. The submucosa and muscularis seem to be replaced by a dense structure of fibrous tissue and smooth muscle-cells. Irregularly distributed through this structure are found masses, columns, rows, or individual cells of the epithelial type and in no connection with the surrounding tissue. Certain areas show distinct unstained globules of colloid material, the cell body or entire alveolus being replaced by the colloid material. The presence of the colloid within the cell body makes most of the cells look unusually large. The structure is that of a colloid carcinoma of the scirrhus type. The peritoneal coat is greatly thickened but apparently not invaded by the tumor-cells. The mesenteric glands show no changes that are definite."

THE IMPORTANCE OF CHRONIC IRRITABILITY
OF THE COLON WITH MUCOUS STOOLS
AS A SYMPTOM OF APPEN-
DICITIS.¹

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As time goes on the number of cases increases in which appendicitis can be studied in its relation to the life-history of the patient, and relations of the disease can be determined which were at first obscure. It is not designed in this place to consider at all the well-established symptoms which accompany the acute inflammations of the appendix, but to draw attention to a point apparently much neglected in the history of some chronic forms of the disease,—viz., the prevalence, possibly for years in the life-history of the individual, of attacks of catarrhal enteritis with copious discharges of mucus. Also to the symptom of mucous discharges, in relation to attacks of recurrent appendicitis.

Patients complain of attacks of diarrhoea with general abdominal soreness without adequate cause. They may be extremely susceptible to temperature changes, so that the abdomen must be protected by woollen clothing at all seasons of the year to prevent the onset of attacks of diarrhoea with pain and soreness. The whole abdomen may be more or less constantly sore to the touch in some cases, and the jar of walking is felt. The slightest indiscretion in diet brings on copious bowel movements, often quite offensive, accompanied by pain, and the free discharge of mucus. The pa-

¹ Read before the Philadelphia Academy of Surgery, March 8, 1898.

tient often mistakes this mucus for pus, and even intelligent persons will erroneously give a history of an abscess, filling and emptying through the bowel repeatedly. The condition may date back to a pelvic inflammatory attack, which, according to the statement of the patient, has been diagnosed typhoid fever, but which was probably appendicitis. This condition of irritability of the colon—for it is a form of colitis—may continue for years before an attack occurs which is sufficiently definite to lead to the suspicion of appendicitis.

The relation of appendicitis to these mucous discharges and irritability of the colon may be approached from two points of view.

(a) As assisting in the differential diagnosis of appendicitis in obscure or complicated *acute* cases of localized pelvic inflammation.

While the typical case of inflammation of the appendix in perfectly healthy young adults can be diagnosed with great certainty along certain well-understood lines, yet no one conversant with the variety of conditions to be met in the abdomen can fail to admit that the question of differential diagnosis in atypical attacks, where long-standing abdominal disease of gall-bladder, ovary, tube, etc., has been present, is often one requiring the nicest discrimination, particularly in women with a history of recent post-puerperal trouble. For example, the writer to-day operated upon a case of ruptured ovarian abscess and ovarian cyst with inflamed appendix adherent to the cyst. One need not look far into the literature of the subject to find that even good surgeons have been mistaken in the separation of appendicitis from such conditions as tubal or ovarian inflammation or abscess, perirenal abscess, extrauterine pregnancy, obstruction from bands, inflammation of misplaced gall-bladder, tubercular disease of the right pelvis, perforated typhoid ulcer, and the like. The point which it is desired to urge in this connection is simply this: that, whether a history of previous attacks of appendicitis can or cannot be made out, if there is a history of chronic irritability of the colon, with frequent *mucous*

discharges, the probability of the involvement of the appendix is enormously increased.

The following case may illustrate the applicability of this test in the recognition of appendicitis in connection with disease of the female pelvic organs:

Mrs. H., aged thirty-eight years, three children, youngest two years old, applied to the writer's service at the Methodist Hospital, suffering from subacute (seven weeks old) inflammation of the right side of the abdomen, together with a history of uterine prolapse and disease. The uterus, however, having been kept inside the body during the recent inflammatory attack, no longer descended, but was held up by a high attachment of the right tube and ovary to a very tender thickening indistinctly outlined in the lower appendical region. The tube was lost in this thickening, and its outer end could not be demonstrated bimanually. Now, according to her history, she had been a great sufferer from pelvic distress ever since the birth of a child three years before, when she had had fever. This looked towards a diagnosis of tubal disease. But the right-sided symptoms especially dated from a so-called attack of typhoid fever eighteen months before, since which she had had four inflammatory attacks in the right side, and was just recovering from the last. This suggested appendicitis also. The writer long ago learned to place a history of typhoid fever in a case presenting itself with a pelvic inflammatory lesion in the same doubtful category with the history of malarial fever occurring in childbed.

The thickening could readily be felt by the vagina, but, while rather low for an appendicitis, it was rather high for a salpingitis, and the question as to whether a median or lateral incision should be chosen had to be decided. When, however, attention was directed to the presence or absence of mucous discharges, their presence was considered strongly confirmatory of the involvement of the appendix, whether anything else were involved or not, and lateral incision was made. The pertinent history was this: During each of the four attacks severe pain would begin over the lower border of the liver; it would gradually extend to the region of the appendix, and this would be followed for a week or more by discharges, several times a day, of mucous stools, a teacupful at a time, with much pain. The Fallopian tube was

found, at the operation, to be several times its normal thickness, but when freed from adhesions near the ilio-pectineal line behind, was seen to contain no fluid, and it was not removed. The appendix was very short and nearly half an inch in diameter. Its walls were thickened by inflammation. It was buried in comparatively firm adhesions beneath the caput coli, and though some yellowish lymph was in its bed, there was no perforation and no pus. There was subacute adhesive peritonitis of the surrounding viscera. The appendical wall was so softened as to perforate during the stripping of the peritoneum prior to ligation. The appendix was removed, the whole abdomen flushed but not drained, and the woman, having recovered, is now awaiting the contemplated operation for prolapse of the uterus.

(b) The possible *rôle* of the appendix in chronic catarrhal intestinal conditions.

This is a subject which calls for more careful study than it has yet received at the hands of the profession.

The writer is convinced that in many individuals suffering from symptoms of chronic colitis or chronic enterocolitis, without distinct crises referable to the right side, the appendix may be and sometimes is at fault. If called upon for an explanation of such a relation, it may be said that an appendix only moderately diseased, as regards its muscular walls, no doubt often presents a sacculated culture field. Its walls are not simply those of the intestine, but contain many glands, and an especial development of lymphoid structure analogous to lymphoid gland structure elsewhere. It is not unlikely that in such a sac or culture-chamber there may be presented a suitable field for the development of such modified conditions of the colon bacillus, or other normal bacteria of the intestine, as render them, when poured out into the intestine, a new factor in its chemistry, favoring the production of the extremely offensive, peculiar, mucous stool seen in these cases.

Two cases may be narrated as further illustrating the subject under consideration.

(1) Male, aged forty-four years. A vigorous and athletic

man of strong character and entirely free from neurotic symptoms. For ten years subject to frequent attacks of catarrhal enteritis due to the slightest causes, especially exposure of the abdomen to cold. Obligated to wear a flannel apron. Gradually increasing sensitiveness of bowels, until allowing a sack-coat to be unbuttoned for a few hours would bring on diarrhœa. In the summer of 1894 a slight attack of appendicitis occurred, recovery following without operation. Two attacks somewhat more severe followed in the next two years. An adherent appendix was removed by another surgeon during an interval in April, 1896. Since that time there has been complete disappearance of bowel trouble. He never resumed the heavy flannel bandage previously worn, and now habitually wears no overcoat in winter, as he says "never knowing that he has any bowels." The relation appears to be established in this case by the two years' subsequent experience of immunity.

(2) A marked case of chronic mucous diarrhœa or colitis. X., aged thirty-four years, married, was sent for operation from a Western city, with a diagnosis of old pelvic abscess, which had discharged repeatedly into the bowel. According to letters brought from attendant and consultant physicians she had had eight months before a tumor in the region of the *left* ovary, which had disappeared after a "very copious discharge of pus from the rectum." This discharge followed several weeks after the miscarriage of a dead fetus. She had been quite ill at the time, with a temperature ranging to 102° F. and a pulse of 130. Every two or three weeks since there were said to be painful accumulations of pus and discharges by the rectum. Her physicians considered her a case of old pelvic abscess with rectal sinus, following abortion. On admission she was found to have a badly torn perineum and a completely retroverted uterus, with a large prolapsed ovary. No pus was found in the stools, which were offensive, frequent, and contained large quantities of gelatinous mucus. She was quite neurotic and was practically invalided. From the remarkably circumstantial account of the former pus discharges, obtained both from the patient and physicians, it was supposed that the remains of an old pus-sac might be found somewhere in the abdomen, but on section this was found not to be the case. The Fallopian tubes were absolutely sound. The left prolapsed ovary contained a cyst, with bloody contents, not more than two

inches in diameter, and not adherent. The uterus was large and doubled sharply back, but no thickening of the broad ligament existed; in fact, nothing could be found which would indicate that an extensive connective tissue inflammation had ever existed. The cystic left ovary was removed, and the uterus suspended. The appendix was very long and large, its walls abnormally thick, but *not adherent*. It was removed in accordance with the writer's custom when operating under such conditions. The perineum was afterwards repaired. During convalescence treatment was directed to the mucous entero-colitis. Colon washing and peptonized milk diet were the chief measures used. Recovery was perfect, though little immediate general improvement followed. She discontinued the milk diet at once and colon lavage later, but her health gradually returned. The mucous diarrhœa ceased in three months; her nervous symptoms entirely disappeared. She gained greatly in weight, and writes nine months later gratefully, "I am in perfect health."

Comment.—She had undoubtedly had puerperal sepsis long before, but it had left no physical traces. At the time of the operation her symptoms were due to lacerations, uterine and ovarian descent, and to chronic mucous colitis. I am, however, unable to explain her cure, except on the hypothesis that the removal of the appendix removed an exciting cause of the colitis.

An examination of some of the principal monographs upon appendicitis fails to show that any considerable attention has been given to the symptom under discussion. Nearly all writers fail to mention it at all. The most complete consideration found was in the excellent treatise of Talamon ("*Appendicite et Perityphlite*," Ch. Talamon, *Médecin de l'Hôpital Tenon*, 1892, Paris, p. 155). He speaks of chronic irritation of the large intestine, followed by mucous colitis (*la colite muqueuse*), as associated with recurrent appendicitis. Alternating constipation and painful mucous stools are among the symptoms mentioned as occurring between the crises. He also says that it is not always easy to decide whether these intestinal symptoms precede or follow the first attack of appendicitis. Not only does he consider, however, that mucous colitis in a number of cases ought to

be considered as a predisposing cause of appendicitis, but that it is also certain that the symptoms of this colitis are observed in recurrent appendicitis during the intervals between crises.

There is a remarkable disease of the large bowel known as mucous colitis or membranous colitis, which is essentially chronic, lasting for years, and which is characterized by stringy, tenacious sheets of mucus, or even tubular casts of the colon, and frequently associated with great pain. According to Osler ("Practice of Medicine") the origin is unknown. He states (page 440) that mucous colitis with enteralgia in nervous women is sometimes mistaken for appendicitis, and that in two instances of the kind he has prevented proposed operation. In his description of appendicitis, however, the writer has failed to find reference to the painful crises followed by discharges of several ounces of mucus, which are undoubtedly observed in some cases of marked chronic appendicitis. Whether he really did the patients a kindness in preventing the operations referred to might be a matter for further consideration and investigation. The differential diagnosis in true mucous colitis would appear to rest upon the existence of mucous casts in the stools. It is not claimed that the pathology of this disease can be settled off-hand by calling the cases appendicitis, but it is claimed that in every such case careful investigation should be made with this relation in view, and if there is good reason to suspect the appendix, it should be removed.

Abundant mucous stools may occur in tuberculous intestinal disease, and in some forms of colon ulceration.

The object of this paper is to draw greater attention to the relation of the two conditions, especially in doubtful cases, and where other diseases coexist. In all cases of chronic intestinal catarrh, especially in chronic nervous invalidism with obscure disease of the pelvic organs, the writer has learned by experience, in a number of cases, strongly to suspect the vermiform appendix. No case should be considered hopeless until this clue has been thoroughly worked

out. A thickened appendix can often be palpated. The very wide distribution of pain must not be allowed to weigh too heavily against the probability of appendical disease. This diffusion of pain is due to the fact that the same plexus of the sympathetic, the superior mesenteric, which supplies the appendix, is also widely distributed to the small intestine. The varying position of the appendix must also be considered. Careful attention to the points under discussion may save a serious error in diagnosis and may lead to the cure of a very troublesome condition of chronic invalidism.

TOTAL EXCISION OF THE FIBULA FOR SARCOMA.

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So far as I have been able to ascertain the case which is now reported is the first example of excision of the fibula for malignant disease. It has been done frequently for benign diseases, but when malignancy has been suspected amputation has always been resorted to.

Two other cases have been reported since: one by Bland Sutton, reported in the *British Medical Journal*, May 2, 1896, p. 1086. His case was a woman, twenty-three years of age, who had a round-celled sarcoma.

The other was only a partial excision, the disease involving the head of the bone. This case was reported by Newman in the *Glasgow Medical Journal*, 1896, Vol. xlv, p. 137. This was also a female, seventeen years of age, with a myeloid and spindle-celled sarcoma of the upper end of the fibula, and four inches of the shaft. A portion of the tibia was also gouged out.

In doing this operation every precaution should be taken to avoid injuring the musculo-cutaneous, anterior tibial, and posterior tibial vessels and nerves, and, if the ankle-joint is involved, care must be taken in the after-dressing to keep the foot at such an angle that, should ankylosis follow, it will still be in a useful position.

CASE.—*Traumatism of ankle followed by sarcoma of fibula; excision of whole fibula; later prophylactic injection of mixed toxines; no recurrence at end of three years.*

On June 23, 1895, a young woman, twenty-three years of

age, was brought to me by Dr. A. R. Thompson, of Troy, New York.

She gave the history of a fall eight years before, which injured her ankle, but did not confine her to bed. In three days she was able to walk. For the next six or seven years she complained of more or less pain in the region of the injury. Four years before coming under observation she had typhoid fever, and on recovery noticed that the joint had become swollen and much more painful. Pain from this time became constant and was increased on walking. The swelling about the joint gradually increased, and in 1894 the tumor was cut into. She was told, at this time, that pus was evacuated, but that there was no involvement of the joint. The wound healed promptly, but the tumor continued to increase in size. Sometimes she thought it was larger than at others.

Examination revealed a tumor of considerable size involving the lower end of the fibula and the malleolus. It fluctuated at points, but the greater part was very firm and distinctly bony. At the lower margin and also across the upper border egg-shell crackling could readily be made out. The diagnosis of sarcoma of the fibula was made, and the question of treatment was thoroughly discussed with the patient. Amputation of the thigh just above the knee was advised, but absolutely declined. After careful consideration of the condition, it seemed to me that practically the same objects would be subserved in a case of this character by the excision, throughout its whole extent, of the involved bone, as though an amputation of the thigh was performed. This was therefore advised and decided upon.

The operation was performed on June 27, 1895, at the New York Post-Graduate Medical School and Hospital. An incision was made from the head of the fibula down to the malleolus, along the outer margin of the bone. The soft parts were dissected free, care being taken to avoid the vessels and nerves. The bone was then cut through about its middle and the upper part quickly disarticulated. The head of the fibula did not communicate with the knee-joint, as is the case, I believe, in about 10 per cent. of the cases.

The lower end of the bone was then grasped firmly and dissected away from the interosseous membrane and muscular attachments down to the level of the tumor, which was then

found to spread out from the fibula and involve the soft parts as well as the periosteum and adjacent surface of the tibia. All of this was cut away when it was discovered that the ankle-joint was also slightly involved. Consequently the joint was opened and all of the diseased tissue carefully and freely removed. It was impossible to accurately approximate the lower portion of the wound because of the amount of tissue removed, so that this portion was packed. The whole wound did not heal by primary union. At this time I was using catgut that I purchased already sterilized, and this case and another one operated upon the same day suppurated. After discarding this catgut we had no further suppuration during this summer. Subsequent examination of the specimen removed was made by Dr. H. T. Brooks, pathologist to the New York Post-Graduate Medical School and Hospital, who pronounced it to be a round-celled sarcoma.

The patient progressed favorably until July 24, when, at the request of her physician, she was given an injection of three minims of the toxins of erysipelas and prodigiosus; no reaction followed. Two days later five minims were given without result, and on July 29 she received a third dose of eight minims; this time the temperature was 101° F. and the pulse 112 two hours after the injection. At the end of six hours the temperature had risen to 102.2° , pulse 96. There was no chill and no local induration or redness.

July 31: The fourth injection of twelve minims was given. No reaction; and on August 2 the fifth injection of twenty minims met with the same result, except for some pain in the leg, lasting nearly all night, and accompanied with some redness.

August 6: The sixth injection of twenty-five minims was followed by nausea, and an hour later the temperature was 102° F., pulse 104. The highest temperature recorded was after two and a half hours, when it reached 103.2° , pulse 104. There was also pain and redness in the foot and leg.

August 8: Seventh injection, thirty minims. Within the next three-quarters of an hour she had a chill lasting fifteen minutes, accompanied with marked cyanosis, and vomited several times. At the end of an hour and a half the temperature reached 104° F., pulse 120, the highest temperature and pulse she had at any time.

August 10: There was no reaction following the eighth in-

jection of thirty minims, and although she received several more injections we were never able to get another reaction.

On August 16 the patient was discharged from the hospital with three sinuses in different parts of the cicatrix. On the inner side of the ankle there was also a small abscess cavity leading backward and upward. Under Dr. Thompson's treatment these sinuses rapidly healed.

This patient was shown at the meeting of the Medical Society of the State of New York, at Albany, January 26, 1898, two years and seven months after the operation.

There has been absolutely no sign of recurrence. The leg is useful, although there is considerable ankylosis at the ankle-joint. She walks with very little limp, and says the leg is perfectly comfortable.

A CASE OF HARA-KIRI WHICH TERMINATED IN RECOVERY.¹

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THE case herewith reported illustrates almost perfectly the horrible act of self-destruction called hara-kiri, which has been practised by the Japanese *Samurai*, or gentlemen of the military class, for centuries; and than which probably nothing shows more strongly the force of education. The *Samurai* from his earliest years is taught to look on hara-kiri as a ceremony in which he may be called to play a part as principal or second. In the families which cling to the traditions of ancient chivalry the child is instructed in the rite and familiarized with the idea as an honorable expiation of crime and blotting out of disgrace. If the hour comes, he is prepared for it, and bravely faces the ordeal which early training has robbed of half its terrors.

The ceremonies observed at hara-kiri are many; and the greatest consideration is shown for the feelings of the principal. None but his friends and the high officers of the court are permitted to be present. For a long time after the revolt against the Tycoon the rite was a daily occurrence in the prison at Yeddo. The victim is placed on a low platform, or *jisaiba*. This is surrounded by a canvas screen, for none of the lower grade officers in attendance are permitted to be spectators. The condemned man is attired in the dress of ceremony, wearing his wings of hempen cloth. He is seated on a rug in the Japanese position, with two *kaishaku* on either side. The *kaishaku* on the left side announces his

¹ Read before the Philadelphia Academy of Surgery, February 7, 1898.

name and surname, and says, bowing, "I have the honor to act as *kaishaku* to you. Have you any last wish to confide to me?" The condemned man accepts the offer or not, as the case may be. He then bows to the sheriff, and a dirk, nine and a half inches long, wrapped in white paper, is placed on a stand such as is used for offerings in temples. He takes the dirk and stabs himself on the left side below the navel, drawing the knife across to the right side. As he falls forward, the *kaishaku* on the left side cuts off his head with a single stroke of his sword. The *kaishaku* on the right takes up the head and shows it to the sheriff. The body is then given to the friends for burial. In most cases the property of the deceased is confiscated.

The ceremony observed at *hara-kiri* appears to vary slightly in detail in different parts of Japan. In all cases, however, where the criminal disembowels himself without condemnation and without investigation, the offence is considered not proven, and the property is not confiscated, because he is no longer able to defend himself.

The following graphic description of the ceremony, as witnessed by Mr. Milford, Secretary to His Majesty's Legation, Japan, serves to illustrate the pomp and ceremony observed on the occasion:

"The ceremony, which was ordered by the Mikado himself, took place at 10.30 o'clock at night in the temple of Seigukuji, the head-quarters of the Satsuma troops at Hiogo. The victim had been convicted of ordering the troops to fire on the foreigners at Kôbê. A witness was sent from each of the foreign legations,—seven in all. After some little delay, the guests were invited to follow the Japanese officers into the main hall of the temple, where the ceremony was to be performed. From the high ceiling hung a profusion of large gilt lamps and ornaments peculiar to Buddhist temples. In front of a high altar the floor was covered with beautiful white mats; on a low platform, raised three or four inches from the ground, was laid a rug of scarlet felt. Tall candles placed at regular intervals shed a

dim, misty light, just sufficient to let all the proceedings be seen. The seven Japanese took their places on the left of the raised floor and the seven foreigners on the right.

"After a few minutes of delay, a stalwart man, thirty-two years of age, with a noble air, walked into the hall, attired in his dress of ceremony, with the hempen cloth wings which are worn on great occasions. He was accompanied by a *kaishaku* and three officers. (The office of *kaishaku*, or executioner, is that of a gentleman, and is in many cases performed by a kinsman or friend of the condemned man; and the relation between them is rather that of principal and second than that of victim and executioner. In this instance the *kaishaku* was a pupil of the victim, and was selected by his friends from among their own number for his skill in swordmanship.) With the *kaishaku* on his left, the condemned man advanced slowly towards the Japanese witnesses, and the two bowed before them. Then drawing near to the foreigners, they saluted in the same way. Slowly, and with great dignity, the victim mounted the raised floor, prostrated himself before the altar twice, and seated himself in the Japanese fashion (knees and toes touching the ground, and the body resting on the heels,—always a position of respect) on the felt carpet, with his back to the altar and the *kaishaku* crouching at his left side. One of the three attendant officers came forward bearing a stand of the kind used in temples for offerings, on which, wrapped in paper, lay the short sword, or dirk, of the Japanese, with a point and edge sharp as a razor. This he handed, prostrating himself, to the condemned man, who received it reverently, raising it to his head with both hands, and placed it in front of himself. After another obeisance, he said, in a clear voice, betraying no sign of fear or emotion, 'I, and I alone, unwarrantedly gave the order to fire on the foreigners at Kôbê, and again as they tried to escape. For this crime I disembowel myself. I beg you who are present to do me the honor of witnessing the act.'

"Bowling once more, he permitted his garments to slip

to his girdle and remained naked to the waist. Carefully, according to the custom, he tucked his sleeve under his knee to prevent himself from falling backward, for a noble Japanese gentleman should die falling forward. Deliberately, and with a steady hand, he took the dirk that lay before him, and looking at it wistfully, almost affectionately, for a moment, he seemed to collect his thoughts for the last time; then stabbing himself deeply below the waist on the left side, he drew it slowly across to the right side, and turning the knife in the wound, he gave a slight cut upward. During this operation he never moved a muscle of his face. Finally, drawing out the dirk, he leaned forward and stretched out his neck. At that moment the *kaishaku*, still crouching by his side, sprang to his feet, poised his sword for a second in the air, and with one blow the head was severed from the body. The *kaishaku* in dead silence made a low bow, wiped his sword, and retired from the raised floor. The stained dirk was solemnly borne away as proof of the execution."

There are many records of the extraordinary heroism displayed in *hara-kiri*. When, for example, the Tycoon, defeated and determined to fight no more but to yield everything, had fled to Yeddo, a member of his council came to him and said, "Sir, the only way in which you can now retain (?) the honor of the family of Tokugewa is to disembowel yourself. To prove to you that I am sincere and disinterested in what I say, I am here, ready to disembowel myself with you." The Tycoon, flying into a rage, said that he would listen to no such nonsense and left the room. But his faithful follower, to prove his honesty, thereupon retired to another part of the castle and solemnly performed the *hara-kiri*.

Three months before his admission to the Pennsylvania Hospital, Henry H., aged forty years, butcher by occupation, because of the loss of eyesight, became very depressed, so that his friends became apprehensive about him, and rarely permitted him to remain alone. He succeeded, however, in stealing a small butcher's knife from the block, concealed it

in his clothing, and walked quietly into the yard, where he deliberately thrust the knife into his abdomen on the left side, and drew it across to a corresponding point on the opposite side, severing all the parietal integument and allowing a large amount of the viscera to escape. He was presently discovered standing in the yard holding a large loop of intestine in his hand, which he exhibited with a tragic air, asking, "What do you think of that?" He was immediately seized by two men, placed in the bottom of an express wagon which was standing in front of the house, and driven to the Pennsylvania Hospital. No time was lost in sending for the attending surgeon, as I happened to be in the Receiving Ward on his arrival. While an anæsthetic was being administered, his clothing was removed, and the protruding mass of bowels was kept covered with hot, wet towels. After the patient was prepared so that a careful examination could be made, it was found that a large transverse wound, eight to nine inches in length, had been made in the abdominal wall, on a line just above the umbilicus, the knife having entered a point corresponding to the left nipple-line and passed across to a corresponding point in the opposite side. From the wound were found protruding the transverse colon, omentum, and a large mass of small intestines, a portion of which, about fifteen inches in length, had been severed from its mesenteric attachment and stripped of its peritoneal covering. In addition to this mutilation, the entire protruding mass of intestine had become soiled from contact with clothing and dust from the bottom of the wagon in which the patient had been conveyed. In order to control the hæmorrhage, the wound was enlarged by an incision in the median line, which enabled me to remove some clots and secure some large mesenteric branches which were bleeding within the abdominal cavity. After a thorough cleansing with hot distilled water, the intestinal mass was replaced within the abdomen, with the exception of that part of the ileum which had been severed from its mesenteric attachment. About eighteen inches of this injured bowel were

resected, care being taken to excise well within the edge of healthy omentum and uninjured intestine, so that the bowel could be accurately approximated, which was done by means of Murphy's button, making an end-to-end anastomosis. The edge of the cut mesentery was accurately approximated on both sides with continuous catgut sutures. During the manipulation all exposed portions of the intestine were protected with towels, which were kept wet with hot sterile water. After another thorough douching and washing out of the abdomen with hot water the abdomen was closed, first by the introduction into the peritoneum of a continuous catgut suture, after which deep retaining stitches of silkworm gut were passed through all integument down to the peritoneum. These were left intact until all the other planes of tissue were accurately approximated with catgut sutures. Lastly, the deep retaining stitches were tied, thus giving much additional support to the wound. Just before the final closing of the wound a "two-way" glass drainage-tube was introduced into the lower part of the vertical incision. The usual antiseptic dressing was applied.

The patient's condition during the operation was fairly good, showing little evidence of shock. The after-treatment varied little from the usual methods pursued in dealing with abdominal operations, by the withdrawal of all food, depending for the first forty-eight hours entirely upon rectal alimentation; then the administration of small quantities of peptonized milk by the mouth, in drachm doses. The tube was flushed hourly for the first day, and afterwards every two hours. It was removed on the second day at the dressing of the wound, which was perfectly clean. On the fourth day the patient had four slight bowel movements.

On the seventh day the wound and temperature showed evidences of some irritation; and on the eighth day an abscess developed in the abdominal walls, which was evacuated by breaking into the line of union with a director. After this the temperature dropped, and remained normal during the rest of his stay in the hospital.



FIG. 1.—Abdominal wound, showing protrusion of intestines.



FIG. 2.—Showing wound with retained sutures.

A skiagraph was afterwards taken of the abdomen, which revealed the button in the median line below the promontory of the sacrum. The bowels were moved daily without any trouble, though, as the patient was a chronic dyspeptic, the stomach was at times irritable. All stitches were removed on the twelfth day and the button was passed on the eighteenth day. After that the patient made an uninterrupted recovery, so far as his physical condition was concerned. Mentally, he is a confirmed melancholic, and has since been removed to the State Hospital for the Insane at Norristown.

In summarizing this unusual case, I cannot help thinking that there were several factors which greatly aided in its favorable termination. Among these may be mentioned the short lapse of time between injury and surgical assistance; the temperature of the day, which was high, prevented chilling of the exposed abdominal viscera, thereby diminishing the tendency to shock; and the thorough douching with hot sterile water during the operation and hourly flushing of the abdominal cavity for two days afterwards. Then, too, by the use of Murphy's button much time was saved in making the anastomosis, thus obviating undue manipulation of the bowel, which always tends to produce for a time a certain amount of paresis of its coats which complicates the after-treatment of the case.

The question naturally arises, How shall we deal with intestinal wounds, or where disease has reduced the lumen of the bowel, so that it is no longer able to perform its normal functions? Under these circumstances we are compelled to excise the injured or diseased portions and endeavor to establish a continuous patulous tract throughout. The methods to be selected depend somewhat on the nature and extent of the injury. Where it is possible to bring the ends of the bowel together easily, and to make a good joint upon which there is likely to be little traction, the end-to-end suture is greatly superior to any other method, because peristalsis will follow its natural course, and because there is little danger of stricture at the line of juncture. If this mode of

union is decided on, the method devised by Maunsell, of first invaginating the bowel, offers one of the most rapid and thorough means of approximating the cut ends of the intestine. If speed is essential, as in the above-mentioned case, Murphy's button, which has made the operation, so far as mechanical aid is concerned, as nearly perfect as possible, may be employed. The chief objections to such devices are the insufficient size of the opening, the possibility of constriction, and the danger of the button becoming impacted.

If from any cause it is found impossible to approximate the cut ends of the bowel, they should be closed, and the coils above and below united by one of the methods of lateral anastomosis.

The length of the intestine that can be excised with recovery has been a question of both clinical and experimental interest. A number of cases have been reported where over a yard of the bowel has been removed. Trzebicky's experiments show that recovery depends not so much on the amount of the intestine removed as upon its situation. Patients in whom the first part of the jejunum had been excised showed more evidences of inanition than where other parts of the bowel were involved. He found that in animals half of the small intestine could be resected if the duodenum were left intact.

REPORT OF SIX CASES OF HIP-JOINT AMPUTATION.¹

By WILLIAM H. NOBLE, M.D.,

OF PHILADELPHIA,

SURGEON TO THE UNION MISSION HOSPITAL.

DURING the past eleven years the writer has been consulted in six cases in which it was necessary to perform amputation of the thigh at the hip-joint. Of these, one was made for crush high up in the thigh; two were made for disease of bone involving the head of the femur and acetabulum; and three were made for osteosarcoma in the tibia.

In the amputation done for crush the greater blood-vessels in the anterior portion of the thigh were first exposed by dissection and ligated, the remainder of the operation being completed by ordinary methods. Two were done by transfixion, hæmorrhage being controlled by digital compression, exerted by means of an assistant's hands passed in through the incision and grasping the flap. Three were done by the use of Wyeth's pins. Constriction was obtained by means of a rubber tube, the so-called racquet method being employed for the amputation.

CASE I.—G. D., aged sixteen years, negro, presented himself, in the summer of 1887, with a swelling in the middle third of the tibia. It was soft, with a jelly-like feel in certain portions. He stated that he had first noticed the growth three months before. At that time it was painless, but for several weeks he had had sharp lancinating pain in the tumor. During the previous winter, while coasting, he had been thrown from his sled, and had sustained a blow on the leg, but that gave him no annoy-

¹ Read before the Section on General Surgery of the College of Physicians of Philadelphia, February 11, 1898.

ance until three months before he was seen. With the appearance of the tumor he began to lose flesh, his appetite grew poor, and when seen he presented the general symptoms of declining health. One sister died of phthisis, but with that exception the family history was apparently good. Amputation of the thigh at the hip-joint was advised, and performed three weeks later. In the interim a futile effort had been made to rebuild his health. The operation employed in this case was that of transfixion. My assistant was a man with unusually long fingers, possessing grip rarely found. When the anterior flap had been cut, the vessels which it contained were secured, and then the remaining steps of the operation completed. There was comparatively little loss of blood. The patient made an uneventful recovery, his health rapidly improved, and for a year he expressed himself as never having felt so well. At the expiration of this time, however, he began to complain of diffused pains in the abdomen, there was progressive loss of flesh, and in a short time nodules could be felt. He died six months later. No autopsy was allowed, but the malady had undoubtedly extended to the abdominal viscera and caused his death.

CASE II.—A. B., aged twenty-two years, negro, was seen in the winter of 1888, with a swelling in the right tibia, painless on pressure. Three years before, while riding a horse, he was thrown, and sustained a fracture in the middle third of the tibia, which healed kindly, and gave no trouble until six months before his first visit. Symptoms similar to those recounted in Case I manifested themselves. There had been progressive loss of flesh associated with occasional lancinating pain in the growth. He was told that his trouble was malignant, and amputation was advised. This was done one week later, the same method being employed as in Case I, and with the same assistant. He also made an uneventful recovery. He was kept under observation for two years, when he moved to a distant city, and though repeated efforts have been made to trace the case since then, it has been impossible to find him; hence the ultimate result cannot be stated.

CASE III.—J. D., aged forty years, was seen in July, 1889. While acting as flagman on a railroad he was run over, sustaining a crush of his left thigh. The bone was shattered high, the fracture extending to the trochanter major. The wheels passed

over the leg diagonally, leaving for a considerable distance below the hip the great blood-vessels intact, and whilst there was profuse hæmorrhage it was not so great as to endanger his life. There was great shock, but at the end of six hours, under warmth and stimulation, he rallied and the amputation was performed. The great blood-vessels were exposed by dissection and ligated, and the amputation was then completed by means of transfixion. His recovery was without incident.

CASE IV.—G. McC., aged twenty-one years, American, by occupation a miller, presented himself at the surgical clinic of the Union Mission Hospital on April 8, 1896. The patient stated that three years before, while engaged in his occupation, he had been struck on the right shin by a block of wood. It gave him great annoyance at the time, and he did not fully recover from its effect for three months, but after that time the leg was apparently well. Three months before presenting himself for treatment he noticed a swelling in the left tibia, just below the knee, which grew rapidly; he had pain in the leg at night and was treated for rheumatism. There was no improvement, and the swelling continued until the time when he was seen by me. There was a soft jelly-like swelling just below the knee in the right tibia, the size of an ordinary orange. A diagnosis of osteosarcoma was made, and amputation at the hip-joint advised. Two of his aunts had died from cancer, one of the breast, and the other of the uterus. Another aunt had died from tuberculosis pulmonalis. His father and mother were living. The mother, however, was in poor health, and had been for the previous ten years. The operation was performed eight days later at the Union Mission Hospital, Wyeth's method being employed. Up to the point when the great blood-vessels, which were exposed to view, had been ligated and the pressure from the tourniquet relaxed, the operation was absolutely bloodless, but the oozing afterwards from the capillary vessels was very great, certainly half a pint of blood, if not more, being lost. The operation was completed and the patient returned to bed in forty-eight minutes. His reaction for four hours was apparently good, when he began to sink and died four hours later in collapse.

At the autopsy macroscopic examination showed no involvement above the site of amputation, though the glands in the abdominal cavity and its contained viscera were carefully examined.

Dr. Frank Massey, then pathologist to the hospital, who examined the specimen, reported that the original growth was a round-celled sarcoma, and that it had extended through the entire shaft of the femur, nests being found as high as the neck and head of that bone. Had the patient survived the operation, it is highly probable that the malady would have reappeared at an early date higher up.

CASE V.—J. DeV., aged twenty-six years, American, salesman by occupation. The family history tuberculous throughout on the father's side. His father died of phthisis. His mother is living and in good health at the age of fifty-three. He has two sisters and six brothers living, and all are in good health.

Previous to July, 1896, he had suffered from persistent diarrhœa for more than a year. On July 19, 1896, while in romp, a hat-pin was thrust into his left knee-joint, producing a septic synovitis. I saw him at that time, and afterwards at intervals during the illness which led up to the amputation, in consultation with Dr. Isaac Leopold, whose patient he was. Within a few days after the receipt of his injury the joint was immobilized by the application of a plaster-of-Paris splint, but there being no improvement, on the 30th of July he was removed to the Jewish Hospital, where, on the 20th of August, the joint was opened and drained by Dr. Leopold. Immediately after the knee was drained he suffered from a most alarming and violent attack of purpura hæmorrhagica, losing large quantities of blood. He bled from the eyes, the nose, the mouth, the ears, the bladder, and the bowels, the body being covered with characteristic hæmorrhagic spots. His recovery was indeed remarkable. The condition of his knee grew gradually worse, and amputation in the middle of the femur became necessary, and was performed by Dr. Leopold on October 14. The wound healed kindly, but in a short time sinuses developed in the stump, which led down to dead bone. On February 17, 1897, the patient was admitted to the Union Mission Hospital, where a second amputation was made two inches below the trochanter major. The bone left behind at that time was apparently healthy, but the wound, while partially closing, did not heal throughout. He improved, however, for a time, but he again began to go down in health, and the probe revealing the presence of dead bone, amputation at the hip-joint was performed, by Wyeth's method, in June, 1897. The

acetabulum was found to be involved, and was curetted until the bone appeared to be healthy. The patient recovered from the operation, but sinuses remained leading down to necrosed bone in the pelvis, and on November 15, 1897, the stump was widely incised and large masses of dead bone curetted away. It was found impossible to remove all the bone involved; the attempt at its complete extirpation was therefore abandoned. At this time he still has discharging sinuses, but is in better health than he has been at any time since the receipt of the initial injury. I would add that the same experience met with in the former amputation by Wyeth's method—namely, very free bleeding after the tourniquet was relaxed—occurred in this case.

CASE VI.—F. F., aged thirty-nine years, American, cigar-maker by occupation, was seen in May, 1897. His father and mother had both died from tubercular troubles; three brothers and one sister are living and in good health. In boyhood he suffered from disease of both hips; the left hip, however, recovered, but remained ankylosed. From the age of six, at intervals, sinuses had opened in the region of the right hip, and pieces of exfoliated dead bone had been thrown off. When first seen four sinuses led down to the joint, and dead bone was revealed at every point reached by the probe. In addition to this, there was a fistula at the right side of the rectum, but it was not possible on exploration with the probe to reach necrosed bone above. His general condition was fairly good, and resection of the head of the femur was advised and performed on June 1, 1897. Dead bone in the pelvis was found to be present, a considerable portion of the acetabulum involved, and at one point it was completely perforated. Immediate amputation was advised, but not consented to. He continued in fairly good health, but suffered great pain, until August 3, when he was admitted to the Union Mission Hospital, and the thigh removed by the method of Wyeth. The operation lasted thirty-two minutes. As in the previous two cases in which Wyeth's plan was adopted, the operation was bloodless until the tourniquet was relaxed and removed. The necrosed portion of the acetabulum was thoroughly curetted and the wound closed. The patient made an uneventful recovery.

The chief difficulty which has always been associated

with amputation at the hip-joint has been the control of hæmorrhage, and the means devised to control it have been almost as numerous as the several operators. The objection to Wyeth's method is the same that applies to elastic pressure for the control of hæmorrhage elsewhere,—namely, that when the pressure is removed, the amount of blood lost from the oozing of small vessels is perhaps greater than in any other means which has yet been devised. It is not always possible to have an assistant possessing the length and strength of fingers of the gentleman who first assisted me. I feel confident, however, that if I were so situated again, when the shortness of time involved in making amputations by transfixion is considered in comparison with the slower methods, I should go back to that operation.

A SURGICAL WASH-STAND.¹

BY FRANK FARROW SIMPSON, M.D.,

OF PITTSBURG, PA.

THE fact that changes in technique are frequently being made, not alone in this section but in all parts of this and other countries, is proof conclusive that thus far surgeons have been unable to prevent infection in all clean cases. Theoretically it seems within the range of possibility to preclude such complications. It is therefore mandatory upon all engaged in surgical work to study carefully the defects in existing conditions, for it is only by constant vigilance and the detection and elimination of every possible source of infection that a perfect technique may be hoped for.

At this time I merely wish to call attention to some of the defects in the wash-stands in general use in surgical operating-rooms, and to present a substitute for criticism. This is done with a full appreciation of the fact that many other conditions and procedures are far more prolific sources of infection, and hence are of greater importance. No surgeon, however, can afford to let one recognized source of infection remain. The reasons are obvious and imperative, not the least of them being that the patient trusts implicitly in the surgeon's skill and in an intelligent and conscientious enforcement of *every* measure conducive to a speedy and complete restoration to health.

It is difficult to trace with absolute certainty any individual infection directly to the wash-stand, just as it is to determine upon any other one cause; but that the stands with fixed basins in general use in operating-rooms are inconsistent with modern ideas of surgical cleanliness cannot

¹ Read before the Allegheny County Medical Society, March 15, 1898.

be denied. Regarding these stands, it may be said that they are, as a rule, identical with those made for household purposes, and were not designed for the use to which they are put. They are intended for bathing the face as well as the hands, and hence are of inconvenient height, and impose an unnecessary discomfort upon the operator. They are so constructed as to prevent dripping, and hence the slab that

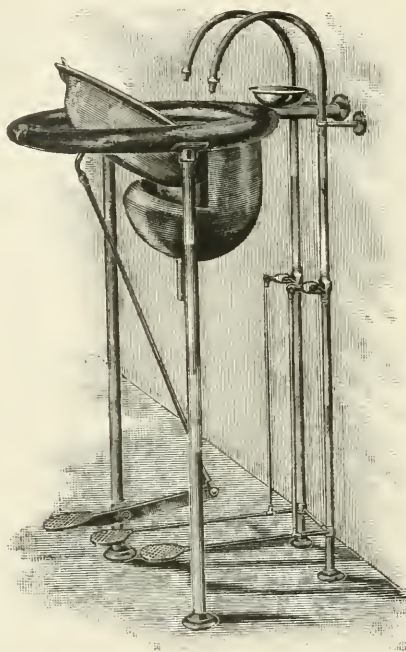


FIG. 1.—Shows stand with tilted basin, as for dumping waste-water ; sewer connections with bottom of receptacle not shown ; soap-stand in place ; hot- and cold-water pipes with pedal attachments.

forms the top drains into the basin. The basin is cemented to the slab, and in some instances has overflow apertures with accompanying sewer connections that are not accessible for cleansing. The basin itself is directly connected with the sewer, and is emptied by handling a plug and chain or some other variety of stop.

A moment's reflection regarding these stands and the use to which they are put will convince one—

(1) That they are liable to become contaminated at any time by the most virulent pus-producing bacteria, for the surgeon's hands or gloves are frequently bathed in pus and then washed in the basin that is to be used a few hours later while preparing for a clean case.

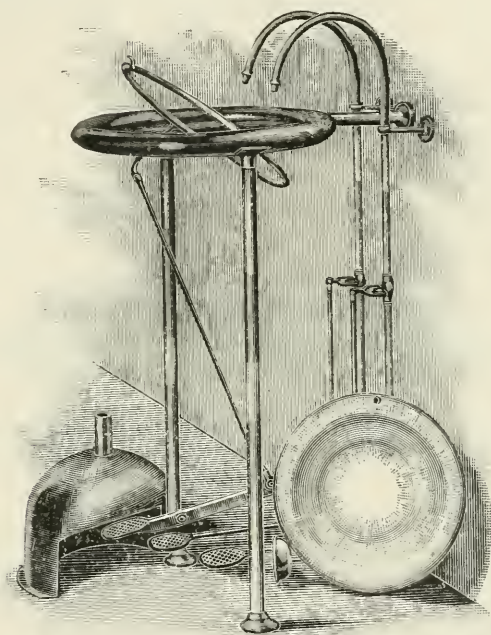


FIG. 2.—Shows stand with tilted ring, which holds basin; basin, soap-stand, and receptacle removed by simply lifting them off; water-pipes with pedal attachments; every part easily accessible for cleansing.

(2) That there are numerous receptacles for septic matter. To be convinced, merely look critically at your own stand at the first opportunity.

(3) That there is enough organic matter for the growth of numerous colonies of micro-organisms, as has frequently been demonstrated, and can readily be proven by taking cultures from crevices.

(4) That being fixed, these basins, plugs, and sewer connections cannot be rendered aseptic. They are therefore a possible source of contamination of the hands, and hence of annoying complications and danger to life, and should be discarded.

Dr. Hunter Robb's pedal attachment for ordinary stands, by which hot and cold water are turned on, marks a distinct advance in sanitary appliances, by rendering it unnecessary to touch a spigot while the hands are going through the cleansing process.

In July, 1897, I had occasion to study the sanitary condition of operating-rooms, and became convinced that if it were of advantage to have pedals for hot and cold water, it would be equally desirable to empty the basin in the same way, and far more so if we could feel sure that the basin were



FIG. 3.—Shows eight-inch pipe through which cold water passes for the purpose of cooling boiled water as it passes through coil of small thin pipe contained within large one.

absolutely sterile. At that time I had a stand made that met those requirements. An effort was made to eliminate every unnecessary inch of material.

This stand, Fig. 1, is thirty-six inches high, and is made of nickel-plated brass. Hot and cold water are turned on by pedals. The basin is tilted by pedal and rod, and waste-water is dumped into a receptacle resembling a funnel or an inverted helmet, which may or may not be connected with sewer. In either case it is easily lifted off for cleansing. The basins are oval or round and made of enameled iron or nickeled copper. They are removed as easily as lifted from a table, are perfectly smooth, have no sewer connections, and are supposed to be boiled or steamed before each operation. The same is true of the soap-stand.

All the water used is supposed to be boiled, the tem-

perature of cold water having been reduced by passing through a coil of thin pipe contained in a six- or eight-inch pipe of running water.

I am convinced that the proper use of such a device will eliminate one source of infection.

A very satisfactory appliance of the above design is made by Feick Brothers, the instrument-makers of this city.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, February 23, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

SUBSTERNAL GOITRE.

DR. F. KAMMERER showed a case of goitre, partially sub-sternal, but to the greatest extent involving the left lobe of the gland. Looking at the patient before operation, a tumor was seen on the left side of the neck which extended into the supra-sternal notch and made it impossible to palpate the trachea at this point. The latter showed marked deviation to the right side. There was distinct fluctuation over the most prominent part of the tumor, in front of the left sterno-mastoid muscle. There was marked dyspnœa. A transverse incision was made with a view to enucleation of the cyst in one of the lower folds of the skin of the neck, but in this case enucleation had to be abandoned and a typical extirpation of the entire left lobe became necessary, owing to severe hæmorrhage and the impossibility of separating the cyst, which had ruptured during manipulation, from that part of the tumor lying behind the sternum. The superior thyroid vessels were therefore exposed and ligated, as also the inferior vessels on the left side. Considerable difficulty was now experienced in developing the part of the gland lying behind the sternum. The isthmus of the thyroid was then divided and the entire left lobe removed. A cavity, extending in a downward direction for two inches behind the sternum, was present after removal of the tumor, which was tamponed with iodoform gauze; and a small opening left in the centre of the original incision for the escape of secretions. The further course of the case was uneventful. The dyspnœa was relieved immediately after operation. Now only, on close inspection, a white streak was visible along the line of suture. The speaker referred to the excellent

cosmetic result after a transverse incision, when compared with the rather marked disfiguration after the old incisions along the border of the sterno-mastoid muscle and in the middle line.

Dr. Kammerer showed the specimen of another case of substernal goitre, a solitary cystic tumor, which he had removed from an Italian, twenty-eight years old. All that could be ascertained from the patient was a history of increasing dyspnœa. When first seen by Dr. Kammerer he was very cyanotic, his breathing was short and labored, and the intercostal spaces, the supraclavicular and epigastric regions, were much retracted during inspiration,—in short, he presented all the symptoms of imminent suffocation. The trachea was pushed to the right, at the point where it enters the thorax. The left side of the neck seemed to be a little more prominent in the region of the thyroid gland than the left. Pressure with the finger into the space between the trachea and the insertion of the sterno-mastoid muscle at the sternum revealed the superior surface of a tumor at about the level of the upper end of the sternum. When the patient coughed the tumor was slightly raised to a higher level and a round prominence became visible over the sternum in the jugular notch. The diagnosis of a tumor compressing the trachea was not difficult.

Anæsthesia being out of the question, a transverse incision was made about an inch above the insertion of the sterno-mastoid under cocaine, and that muscle divided. The upper border of an oval tumor then became apparent, which, on further dissection, proved to be the left lobe of the thyroid gland, as a continuation of it (the isthmus) could be seen running in an upward direction over the anterior surface of the trachea. When traction was made on it, in an upward direction, it could be delivered from its position behind the sternum for about half its length, but during inspiration it was again drawn into its bed behind the sternum. With considerable trouble it was finally developed and removed after cutting through the isthmus.

The trachea was flattened where compression had been exerted by the mass, which proved to be a cystic goitre. Immediately after the tumor was raised from its position behind the sternum there was distinct relief to respiration, but the latter was not entirely free. The cavity of the wound was loosely tamponed. The patient did fairly well for the next few days; then dyspnœa

was again so marked, with absence of any pulmonary symptoms, save pronounced emphysema, that tracheotomy was resorted to, under the impression that the deformity of the trachea was responsible for the condition. But, even with a flexible canula, reaching to the bifurcation of the trachea, the condition was not relieved. The patient continued thus for about five weeks, careful physical examination revealing nothing abnormal in lungs or heart, with the exception of emphysema and bronchitis, until he finally succumbed to exhaustion.

The autopsy was entirely negative. There was no constriction of the trachea or of the bronchi at any point, and the trachea had evidently reassumed its normal position, as the wound-cavity closed and filled up with granulations.

Dr. Kammerer said he was entirely at a loss to account for the continued presence of respiratory dyspnoea in this case.

VASECTOMY FOR HYPERTROPHY OF PROSTATE.

DR. ROBERT H. M. DAWBARN presented a man, sixty-three years old, who since October, 1894, had been suffering from chronic hypertrophy of the prostate, with about four ounces of residual urine, and chronic cystitis and chronic nephritis, the former having developed in spite of irrigation of the bladder.

In January, 1897, he developed an abscess of the right kidney, for which he was operated on by Dr. R. C. Kemp under cocaine anæsthesia, the usual lumbar incision being made. The kidney was drained for several months, and after three months the lumbar incision was allowed to close. The evidences of Bright's disease and cystitis remained the same. The man was taught self-catheterization, and was repeatedly put to bed, the bladder irrigated, etc. As soon as he stopped using the catheter his urine promptly became ammoniacal, and he could not hold his water for more than thirty minutes.

In November, 1897, under cocaine, Dr. Dawbarn removed between two and three centimetres of each vas deferens. In order to test the value of this procedure the catheter was only employed once subsequent to the operation. The result of the operation was remarkable. Within a month the man was able to hold his water for two or three hours, and this interval had gradually lengthened until he could hold it from four to six hours during the day, and was not obliged to get up to urinate during

the night. His prostate has shrunk fully one-third, and his testicles have also shrunk. For a long time previous to the operation the man had lost the power of erection.

Dr. Dawbarn said he did not clearly understand why the operation should affect the testes or the prostate as it does. This operation is certainly the simplest and safest to resort to in these cases, and, if the patients are willing to submit to it, the speaker thought it should be tried before any of the more severe operations are undertaken.

The man's urine at present is perfectly clear, although it still shows evidences of Bright's disease.

DR. F. TILDEN BROWN said he agreed with Dr. Dawbarn that this operation was the simplest one to resort to for the relief of enlarged prostate and troublesome micturition. In one such case where he performed the operation, two or three years ago, the result was surprisingly good.

The atrophy of the testicles in Dr. Dawbarn's case might perhaps be explained on the ground that by excision of a part of the vas deferens traction is exerted on the vessels of the cord, thus lessening their calibre and interfering with the nutrition of the testes. The speaker suggested that if the vas be tied in two places with silk, there would be complete and permanent occlusion of the tube, which would perhaps be less conducive to atrophy of the testicles.

DR. F. H. MARKOE said that in several cases of chronic prostatic hypertrophy in old men he had resorted to the operation of ligating and cutting the vasa deferentia, with very rapid and beneficial results as regards the size of the prostate, the frequency of micturition, the amount of residual urine, and the character of the urine. In one case, a man over seventy, the frequency of micturition had greatly improved within three days after the operation, and within a month the quantity of residual urine was much diminished.

Dr. Markoe said he was unable to speak regarding the ultimate results of this operative procedure, as his cases were lost sight of within a few months after operating.

DR. WILLY MEYER said that recently Hoffman reported, from Mikulicz's clinic, twenty-four cases of excision or ligation of the vasa deferentia for chronic prostatic hypertrophy, where the patients had been kept under observation for a year or longer,

and an analysis of those cases showed that the ultimate results of the operation were very poor. The immediate result was usually excellent, but after a time the old troubles return. The improvement has been attributed to sudden depletion of the prostatic venous plexuses, produced by reflex irritation of the vasomotor fibres.

DR. KAMMERER said that during the past eighteen months he had performed this operation seven times, and about four weeks ago he took the trouble to look up these patients. The result of this investigation was a great disappointment to him, as there was no permanent improvement in any of the cases. In most of them the immediate result was a very promising one, in some even striking, but the final results in six cases were almost *nil*, the patients being in exactly the same state as before operation. In his last case, which was operated on about three months ago, the immediate improvement was remarkable. The patient had suffered for years, had been reduced to catheter-life for some time, and his bladder was in a terrible condition. There was no possibility of passing any urine spontaneously. It had to be drawn frequently, and the bladder was irrigated twice a day to give a little relief. Immediately after the operation he could pass his water, and the catarrhal symptoms gradually disappeared without any further irrigations. But now, after such striking improvement, the old trouble was returning again, and from his previous experience the speaker felt convinced that this case would also go the way of the others, and that no permanent benefit would accrue from this operative procedure. He personally believed castration was decidedly more effective.

DR. DAWBARN said Dr. Brown's suggestion—that atrophy of the testicles after excision of part of the vasa deferentia might be due to the fact that the testicle being no longer held up by the vas deferens, traction is thus exerted on the vessels of the cord, thus lessening their calibre—was possible, but in that case, why is it that in varicocele, where the left testis hangs so very low, we do not get atrophy excepting in extreme cases?

DR. F. TILDEN BROWN said that in cases of enlarged prostate we have a mechanical barrier to urination, causing residual urine and often cystitis, with frequent and painful micturition. The speaker said he had in mind another class of cases, where there is no residual urine, but difficult and frequent micturition,

which is possibly due to some abnormal condition of the prostatic urethra at the entrance of the ejaculatory ducts, and by ligation of the vasa deferentia these symptoms might be improved by affecting the innervation of this particular region. Consequently, in reporting cases of enlargement of the prostate improved by operations on the vasa deferentia or testes, it appears essential to give the relative quantities of residual urine found before and after operation, as well as the changes regarding frequency and painfulness of urination.

POSTERIOR GASTRO-ENTEROSTOMY WITH MURPHY'S BUTTON.

DR. WILLY MEYER presented a man, fifty years old, who for six years had complained of stomach trouble, his symptoms being pain, nausea, and vomiting. He had lost about thirty pounds in weight. He had never vomited blood. He had been treated by lavage and other means without any benefit.

When he came under Dr. Meyer's observation, about the middle of November, 1897, the stomach was much enlarged and it was impossible to palpate the pylorus. Peristalsis of the walls of the stomach could be distinctly seen. On washing out the stomach bits of food were removed which he had swallowed weeks before; the gastric secretions contained a large amount of hydrochloric acid, but no lactic acid.

On December 24, 1897, an operation for the relief of the man's condition was undertaken, Schleich's mixture for general anæsthesia being employed with very satisfactory results. The pylorus, which was situated slightly behind the liver, was found without much difficulty; it was the seat of an almost impermeable stricture, evidently of benign nature, as had been expected. No enlarged glands were felt.

After the insertion of one-half of a Murphy button into the jejunum, the transverse mesocolon was rapidly perforated by blunt dissection and stitched to the posterior wall of the stomach, in which the second half of the Murphy button was then inserted. At this stage of the operation the patient's pulse was so feeble that an intravenous saline infusion was given, with marked benefit.

The anastomosis was accomplished without difficulty and strengthened by a continuous suture of silk. The parts were

then allowed to drop back into the peritoneal cavity. The wound was closed, and the patient made an uneventful recovery. Since the operation he has gained very much in weight and strength.

Dr. Meyer said he had up to the present time performed posterior gastro-enterostomy five times with the aid of the Murphy button, and he expressed the opinion that this operation was far preferable to anterior gastro-enterostomy, which he had done with the button ten times. The posterior operation is the one now always resorted to at the Turin clinic, where they have had no death in the last twenty-one cases, having used the Murphy button in all of them. The button is usually discharged in the course of time, and even if it is retained it is not apt to do harm. The patients still sent for operation by the medical men are generally in such poor condition that local anæsthesia should be employed whenever possible. As soon as the patient's pulse jumps up to 120 or over during or after the operation a hot intravenous saline infusion is indicated.

About a month ago, Dr. Meyer said, he performed posterior gastro-enterostomy on a baby six weeks old, for the relief of a congenital stricture of the pylorus. The child was very much emaciated, weighing only seven pounds. The smallest Murphy button in the market, when inserted after the running suture had been put in place, was found to be rather large for the jejunum, which was much contracted. The gut could be pulled up to the stem, though with much difficulty. The child did well for forty-eight hours and then died, after a severe fit of vomiting. The post mortem showed that death was due to the button, which acted as a mechanical obstruction to the bile.

TREPHINING FOR INTRACEREBRAL CYST.

DR. WILLY MEYER presented a young married man, thirty years old, whom he had first seen with Dr. George W. Jacoby in October, 1897. The patient stated that he had enjoyed good health until he was twenty-three years old; then, while working in the ice-house of a butcher-shop, he was overcome by the cold and remained unconscious for a few minutes. Subsequent to this he was well until the summer of 1893, when he had an epileptic attack and lost consciousness; four similar attacks occurred at irregular intervals up to 1896. Since then he has had no general convulsions and no loss of consciousness, but there have

been convulsive movements of the left side of the face and numbness, with loss of feeling in the left hand and thumb, fore and second fingers. During the past six months he complained of frequent and severe headaches, with buzzing in the ears; there was also occasional vomiting and loss of power, first in the left arm and then in the left leg.

An examination of the head showed a slight prominence on the circumferential line, about twelve centimetres from the glabella and eight centimetres above the auditory canal. The prominence, which was on the right side of the skull, was about the size of a silver dollar and was painful on pressure. The left pupil was smaller than the right and slightly irregular. Both reacted promptly to light and accommodation. The ocular muscles were normal; there was no impairment of hearing. Vision was reduced and examination with the ophthalmoscope showed optic neuritis. There was paralysis of the left facial nerve, of central origin. The muscular sense of the upper extremity was impaired. There was no analgesia nor anæsthesia; there was left hemiplegia and increased tendon reflexes.

A diagnosis of tumor of the brain or hæmorrhagic cyst was made. The patient was operated on October 16, 1897. After the skull was laid open with the mallet and chisel and the arm centre located by Dr. Jacoby, the dura mater was turned back. This revealed a bulging mass, which was aspirated, about forty cubic centimetres of a slightly turbid fluid being evacuated. The flabby walls of the cyst were then removed as completely as possible with the knife and scissors. The bleeding was so profuse that soon after the operation had been finished an intravenous saline infusion became necessary; six hours later a second one. In order to check the hæmorrhage a gauze-tampon was inserted in the cyst cavity. When it was removed, after forty-eight hours, to replace the bone plate and do secondary suture, it was found that the tampon and bone-flap had been raised by protruding brain. This, the speaker thought, might have been produced by the increased intracerebral pressure, due to the saline infusions, which were given while the head was in a low position. Recovery was uninterrupted. The brain could not be replaced in the course of the after-treatment. Its surface soon granulated and was later covered by Thiersch's grafts. Two weeks after the operation the bone was shelled out subperiosteally from the

turned-down skull-flap. To-day this mass is soft and fluctuating, and protrudes considerably above the skull; it becomes tense when the patient lowers his head. Dr. Meyer said he had thus far refrained from aspirating it, fearing that it had some connection with the cerebro-spinal fluid. The mass is protected from injury by a small aluminum cap, which the patient constantly wears.

Since his discharge from the hospital the patient has been free from headaches and enjoys very good health. There is still some paresis of the left arm and leg.

DR. B. FARQUHAR CURTIS said that about eighteen months ago he had operated on a boy some ten years of age for a supposed hæmorrhagic cyst which was giving rise to epileptic attacks. On opening the skull nothing abnormal was at first observed, but at that moment the child went into collapse, and at the same time the cortex of the brain in the region exposed sank in to a considerable depth. After the child's condition had improved a small incision was made through the cortex, and this revealed a hæmorrhagic cyst, which was so large that it was at first mistaken for one of the ventricles. After evacuating part of the fluid the cortex was easily united with three sutures. The boy made a good recovery and remained free from his epilepsy for three months. Then he had another series of attacks, and without opening the scalp about two ounces of a clear fluid were withdrawn with the aspirator. The patient then remained well for about three months, when aspiration was again resorted to. He has since remained well (about one year), the cyst, apparently, having ceased to refill.

Dr. Curtis said the protrusion of the mass in Dr. Meyer's case may be due to increased venous pressure, forcing the brain forward, together with the cyst.

REMOVAL OF THE NOSE FOR EPITHELIOMA.

DR. ALEXANDER B. JOHNSON reported the following case and showed a specimen in connection therewith: The patient, a man sixty-eight years old, was admitted to Roosevelt Hospital on February 1, 1898. His father had died of cancer of the face. He had enjoyed good health until two and a half years ago, when he noticed a small papule on the side of the nose which gradually increased in size. When the patient came under observation

the nose was covered by a tumor which was about two and a half inches in its transverse and vertical diameters and which encroached on the cheek on either side and partly covered the right eye. The surface of the tumor was ulcerated and bled easily and profusely. The growth seemed to be attached to the nasal bones, and was soft to the feel. No enlarged glands could be felt.

On February 11 an incision was made around the tumor down to the bone. The nasal bones and septum were then rapidly divided with the chisel and the growth removed. The rather severe hæmorrhage was checked with ligatures and cautery. Recovery was uneventful.

The removal of the nose in this case, Dr. Johnson said, left a large granulating wound, about two inches long and two and a half inches transversely, and the question comes up whether, in order to cover this marked deformity, it is better to resort to artificial means or attempt some plastic operation. The speaker referred to a case where the late Dr. Sabine constructed a fairly satisfactory nose by transplanting the terminal phalanx of one finger. In general, he said, he preferred the appearance of a good artificial nose to any result which he had seen after a plastic operation for the replacement of the entire nose.

DR. ABBE, who had seen the patient upon whom Dr. Johnson had operated, said the loss of the tissues was so extensive in this case that he did not think they could be satisfactorily replaced by any plastic device. In this instance the tissues were involved well up to the canthus of the eye on both sides, and it would be impracticable to bring down a flap from the forehead. Furthermore, it would be well to avoid any extensive plastic operation in such an old man. Another point in favor of an artificial nose is that in case the disease recurred, it could be better controlled.

In some cases, Dr. Abbe said, very satisfactory plastic operations on the nose can be performed. He had been able to make a very good bridge for a nose by means of a ridge of periosteum-covered bone, chiselled from the frontal bone between the eyebrows and turned downward, and then covered by a skin-flap.

DR. WILLY MEYER said that about five years ago he had presented a case where he had removed the entire nose, a portion of the cheek, and one eye. In that case he had covered the

cheek and orbit with a large flap from the forehead, and then Dr. Tetamore, of this city, fitted the woman with an artificial nose attached to a pair of spectacles, which helped greatly to hide her deformity.

DR. JOSEPH D. BRYANT said that in a number of cases where he had endeavored to relieve deformities of the nose by the transplantation of flaps the results had not been entirely satisfactory to him. His success was not in those cases where he had transplanted periosteum, as the latter was usually absorbed. The speaker said he knew of one case where death from septic poisoning had occurred after such a plastic operation. He thought Dr. Johnson would be better satisfied with an artificial nose in the case under discussion than with one constructed by plastic methods. He suggested that it would be well, however, to consult the patient beforehand, because in one instance coming under his observation the patient positively refused to wear any artificial appliance, and expressed his preference for a "meat" nose, even if much less symmetrical.

TRAUMATIC RUPTURE OF THE KIDNEY.

DR. JOHNSON exhibited a kidney removed from a man twenty-two years old, who had been admitted to Roosevelt Hospital on February 7 with the following history: On the day of his admission he had fallen over a beam and struck the left side of his body against a post. This was followed by a sudden sharp pain in the left loin. When he was brought to the hospital his pulse was soft and he appeared to be in a very anæmic condition. The region of the left loin was tender and somewhat swollen. There was dulness on percussion below the ribs in the loin. Eight ounces of very bloody urine were withdrawn through the catheter.

On the following day the patient was restless and vomited. His temperature was 102.3° F.; pulse, 105. His urine contained a small amount of blood. The next day the region of the left loin was still more tender, and there was some bulging of the abdominal wall. The temperature gradually rose until it reached 104.6°. The urine contained a few blood-cells.

On February 10 (three days after his injury had been received) the man was etherized and an incision made over the left side of the abdomen. A large hæmatoma was found, from

which over a pint of blood was evacuated. The left kidney was then laid bare, and it was found that it had been completely torn through in the middle. Its ureter and vessels were tied off and the organ removed. The wound was then partially closed and drainage inserted. Within twenty-four hours after the operation the man passed thirty-six ounces of urine. Since that time he has been secreting from forty to forty-five ounces daily. An examination of the specimen showed that the rupture extended into the renal pelvis, and that the torn surfaces of the kidney were pulped. Recovery had been uneventful.

DR. KAMMERER said he had had one case which was very similar to the one reported by Dr. Johnson. The patient was a girl, who was brought to the hospital five weeks after she had met with an accident, which had caused, apparently, a perinephritic abscess. On opening the abscess, however, he found that he had to deal with a ruptured kidney, the organ being torn completely through. The kidney was removed and the patient made an uneventful recovery.

TRANSACTIONS OF THE SECTION ON GENERAL SURGERY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Stated Meeting, January 14, 1898.

The President, DR. R. G. LECONTE, in the Chair.

TARSECTOMY FOR TALIPES.

DR. JOHN B. ROBERTS showed a child about four years of age who had been operated upon for double-club-feet in childhood, but owing to want of intelligent after-treatment or other cause the condition was not improved. When the patient was first seen by Dr. Roberts there existed an extreme degree of pes varus in both feet. It was evident that simple tenotomy would not correct the deformity. One foot was operated upon at a time, and in the following manner: An incision was made on the outer side of the foot, after which the cuboid was resected, then the external and the middle cuneiform, and portions of the os calcis and astragalus, the idea being to effect the removal of such bones as interfered with the proper correction of the deformity. To determine this an effort at correction was made after each bone was removed, as it was easy in this way to see just what interfered with full correction. The tendo Achillis and plantar fascia were also divided. The feet are now quite straight, and the soles almost perfectly flat. The child will now be fitted with supporting shoes, and treated by massage for increasing muscular development.

CONGENITAL ABSENCE OF ANUS AND RECTUM.

DR. R. G. LECONTE reported the case of a male infant who was admitted to the Children's Hospital in August, 1896, six hours after delivery. The infant weighed eight and a half pounds, was well nourished and well formed, with the exception that there

was no terminal opening for the bowel, and the urethra ended on the under surface of the penis at its middle portion. On the perineum just anterior to the tip of the coccyx there was a small, unpigmented, dimple-like depression of the skin. The catheter drew only clear urine from the bladder, and as there was no history of the passage of meconium through the urinary tract, operation was immediately begun. No anæsthetic was given. The child was placed in the lithotomy position, a catheter passed into the bladder as a guide, and the perineum incised in the middle line for the distance of an inch, the incision terminating at the coccyx. It was gradually deepened with the knife, care being taken to keep in the median line and cut towards the sacrum. There was almost no bleeding. When the incision had reached a depth of one and a half or three-quarter inches, and no bowel had been encountered, it was decided to abandon this route and undertake Littre's operation, or left inguinal colotomy. An incision was made parallel with Poupart's ligament and half an inch to the inner side. The colon immediately presented distended with meconium. It was drawn up as far as possible from the pelvis and stitched to the abdominal wall with a continuous silk suture. An incision a little over half an inch long was then made in the bowel, and a quantity of sticky, dark-green meconium evacuated. Culture tests were made of this which afterwards proved sterile. The child was on the operating-table about thirty-five minutes. He cried occasionally when the intestine was handled, and also when the skin of the perineum and abdomen was incised, but for the greater part of the operation he slept quietly. The loss of blood amounted to about a drachm, and there was no shock. The child was placed on a mixture containing equal parts of milk, cream, arrow-root water and lime-water, and fed with a dropper. During the first twenty-four hours, the child slept quietly the greater part of the time, took his nourishment well, and had no pain. During the second twenty-four hours the temperature rose to over 100° F., the child was restless with frequent attacks of colic, the tongue was furred, the movements were frequent, loose, light brown in color, with curds and mucus. With the movements there was a protrusion of the mucous surface of the bowel from the artificial anus, which looked like an intussusception, but was easily reduced when the colic was over. There was no distention. The skin was slightly

tinged yellow: the nourishment was poorly taken, and the child was emaciating. Calomel, bismuth subnitrate, and bicarbonate of soda were ordered. During the third twenty-four hours, the nourishment was badly taken, emaciation was rapid, the skin was deeply jaundiced, the movements were very frequent, with severe tenesmus and almost constant protrusion of the mucous surface of the bowel. Still there was but slight tympany and no tenderness of the abdomen. The next day the child died, the temperature rising to 102° , the jaundice deepening in color, and the same symptoms of gastro-enteritis persisting.

The post mortem was made by Dr. Alfred Hand, Jr., who furnished the following notes:

"Post-mortem examination, August 11, 1896. Male infant, five days old, examination four hours after death; rigor mortis present; skin covered with a growth of long, downy hair on arms and chest. No anal orifice; a wound in the left lumbar region communicating with the colon. Pressure along the urethra causes a purulent fluid to exude at the meatus urinarius, which is situated on the under surface of the penis at its middle. Lungs, heart, thymus, liver, and spleen normal. Kidneys, horse-shoe, the fusion being at the lower ends. Intestines distended with gas; no signs of peritonitis. The rectum ends in a blind pouch at the base of the bladder, and a blunt probe passes with almost no resistance from the rectum through the urethra. No gross lesion to account for death."

Dr. Leconte remarked, in reporting this case, that congenital malformations of the rectum and anus are said to occur about once in 10,000 births. Zöhrer, of Vienna, and Collins, of Dublin, in a collection of over 66,000 deliveries found only three cases.

Bodenhamer's classification of these cases is as follows: (1) Congenital narrowing of the rectum or anus without complete occlusion. (2) Complete occlusion of the anus by a membranous diaphragm or by well-formed skin. (3) The anus is absent, and the rectum ends in a blind pouch at a point more or less distant from the perineum. (4) The anus is normal in appearance but ends in a cul-de-sac, and the rectum ends in a blind pouch at a variable distance above this point. (5) The anus is absent and the rectum ends by a fistula, opening at any point of the perineum or sacral region. (6) The anus is absent and the rectum ends

in the vagina, bladder, or urethra. (7) The anus and rectum are normal, but the ureters, vagina, or uterus open into the rectal cavity. (8) The rectum is totally absent. (9) The large intestine is totally absent.

The two most common types are 3 and 6. Bodenhamer in 287 cases found eighty-five opening into the genito-urinary tract, and fifty-three in which the rectum ended blindly without an anus. The cause of these malformations is arrested development of the parts in early foetal life. The rectal invagination or procodæum fails to effect a junction with the cloacal section of the alimentary canal.

The case just reported belongs in the sixth group and to a subdivision in this called atresia ani vesicalis. Here the rectum may communicate with the bladder by an opening near the fundus or by a narrow orifice near the base of the organ. Sometimes a fibrous chord runs downward from the rectum in the position of the natural bowel. Curling has explained the presence of this chord as being the remains of the rectum obliterated by intrauterine ulceration.

The diagnosis of these cases is usually made by the passage of fæcal matter intimately mixed with the urine, accompanied generally with pain, straining, and swelling of the abdomen, owing to the insufficient evacuation of the fæcal matter. In this case no fæcal matter passed with the urine and none was found on the diaper.

The prognosis is unfavorable, as the termination of the rectal pouch is high, owing to the bladder in infancy being an abdominal organ.

The treatment is, of course, operative. As to the time for operation nothing is gained by waiting; the chances of recovery are proportionately decreased with the length of the delay. Delay has been recommended with the hope that distention may show where the bowel terminates. If the termination is near the perineum, distention will undoubtedly cause a bulging, but in such cases a very superficial dissection of the part will show the bowel without distention. If the termination of the bowel is high, no amount of distention will cause such a bulging. Where delay is advocated, the distention does not occur as the result of an increase in bulk of meconium and fæcal matter, for these substances shrink decidedly, owing to the absorption of their fluid

portion by the bowel, but it does occur as the result of fermentation or decomposition and is therefore mostly gaseous, with the concomitant dangers of paralysis of the intestine, absorption of the products of decomposition, and possible bacterial invasion of the peritoneum. Again, every day of delay increases the sensibility of the child and also increases the nervous shock of operation, if no anæsthetic is used.

Dr. Leconte advised immediate incision in the perineum with a careful search for the bowel. If it is not found Martin's suggestion may be followed. He introduces a staff into the bladder and cuts as in lithotomy, continuing the incision until the rectum is freely opened. This leaves the patient with a fæcal and urinary fistula, which has a great tendency to contract as time goes on. The reporter's preference would be to close the perineum, if the bowel is not found, and then to proceed with an inguinal or lumbar colotomy, preferably the former, as the lumbar region affords too small a space. Ball has suggested that after the inguinal incision is made, the colon shall be completely divided and the lower portion closed, while the upper portion is sutured in the wound to form the artificial anus. This will absolutely shut off the alimentary tract from the genito-urinary, but it is likely to increase the shock of the operation owing to the longer time necessary for the procedure. If the opening from the bowel into the bladder is small, it will probably close spontaneously, when it is no longer needed for the passage of fæces. If it does not, his procedure could easily be undertaken at a later age.

In pulling the bowel up from the brim of the pelvis as far as possible and then attaching it to the skin, in the case reported, his idea was to leave as small a pouch as possible for the accumulation of fæcal matter. In this he believed he erred, as the bowel immediately above the artificial anus was left without much support and loose, ready to prolapse, and also favorable for the formation of intussusception, if severe tenesmus occurred. In the future he would prefer to pull the bowel down, and allow the resulting blind pouch to take care of itself.

The fatal termination of the case reported was induced, not by the operation, but by the extreme heat during August, 1896, together with the absence of the child's proper nourishment,—*i.e.*, mother's milk.

DR. T. S. K. MORTON described the case of a child who was found at the end of twelve hours after birth to have no anal orifice. The physician had performed a deep perineal section, but did not discover the bowel. It was noticed that some meconium was passed with the urine. The patient came under Dr. Morton's care thirty-six hours after birth. The child was poorly nourished and the abdomen much distended. He administered chloroform and extended the perineal incision, but did not find the rectum. He then resected the coccyx, when the bowel came into the wound. The rectum was sutured to the skin incision and opened. The bowels were moved freely. The patient died in a few hours from exhaustion.

DR. MORTON related another case, that of a girl nine or ten months of age when she came under his observation, in which the rectum opened into the vagina. In this case he determined to go through the perineum and isolate the rectum high up and follow it down to its termination, resecting, if necessary, the coccyx. He was, however, able to accomplish his object without the latter. The rectum was dissected free from its junction with the vagina and sutured to the skin in the proper position. The vaginal opening was closed by first uniting the mucous membrane and then the perineal wound. The result was all that could have been desired; both the appearance and the function are perfectly normal. It is probable that the sphincter was saved in transplanting the anal orifice.

OPERATIONS FOR BREAST CARCINOMA.

DR. W. H. NOBLE, in presenting two women to illustrate result of operation for removal of carcinoma of breast and axilla, said: In December, 1896, Dr. Charles McBurney presented to the New York Surgical Society a woman on whom he had performed amputation of the breast, after the Halsted method, with this modification—"the lower incision was not carried into or above the axilla, but below it, thus avoiding leaving a scar in the axilla, and thereby permitting the freest use of the arm. It possesses the advantage to women who wish to wear evening dress, that the scar is not visible," and it seemed to him to possess this additional advantage, not alluded to by Dr. McBurney, that in cases where drainage was necessary it was much more easily effected.

During the past year in four cases in which he had had occasion to make amputations of the breast, he had adopted this method. The cases presented illustrated the results secured. The first case was a girl, twenty years of age, on whom the operation was made for sarcoma. She could now wear evening dress without any one suspecting that she had lost her left breast. The lower line of incision extends straight back to the latissimus dorsi muscle, and is carried up along its border to a point on the arm sufficiently far to allow the skin to be turned completely back, so that the contents of the axilla may be removed. The motion in this woman's case is good. She is able to perform her work (that of a weaver) without difficulty. The only apparent impairment of motion is to be found when she attempts to put her hand to the back of her head. All the other motions are absolutely good.

The second case was that of a negress, aged forty years, on whom the operation had been performed for carcinoma three weeks before. There was still some sensitiveness on very free motion, but all the motions of the arm were preserved.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, February 7, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

RECOVERY AFTER HARA-KIRI.

DR. RICHARD H. HARTE read a paper entitled "A Case of Hara-Kiri which terminated in Recovery," for which see page 745.

DR. JOHN ASHHURST, JR., said that he had seen this patient when he was admitted to the hospital, and could testify to the very desperate condition he was in. No one supposed that he would recover, for patients commonly perish after abdominal wounds of very much less severity. It recalled to his mind what Dr. Harris used to say as to the Cæsarean operation, that when it was performed with a cow's horn it was often more successful than when done with the surgeon's knife. There could not have been an abdominal section more successful than this, and a majority of the cases in which a surgeon would feel justified in even less extensive interference would be apt to terminate fatally.

COMPOUND FRACTURE OF THE HUMERUS.

DR. THOMAS G. MORTON presented a boy, thirteen years of age, who was admitted to the Pennsylvania Hospital, November 9, 1897, immediately after he had been injured by falling from a wagon and being squeezed in between the wheels and a passing trolley car. Upon examination the principal injury was found to be a fracture of the left humerus about the middle, attended by a large wound on the inner side of the left arm, on a line with the vessels, where the bone had apparently been driven through the skin. The fracture was comminuted.

The arm was placed upon an internal, angular splint, after the fracture was supposed to have been fully reduced, which re-

quired considerable manipulation, as the fragments of bone were greatly displaced. A pasteboard splint, moulded over the shoulder and arm, was also applied. There was considerable swelling of the arm and forearm, with feeble radial pulse observed soon after the arm was dressed. A radiograph, taken at this time (see Plate), showed an irregular, oblique fracture, with a detached fragment of the bone lying transversely between the upper and lower extremities of the fractured bone. The fragment measured an inch and a half in length by half an inch in width.

Several efforts were made, by manipulation, to bring this separated portion of bone in relation with the other fragments, and to retain it with splints. A radiograph, taken two weeks later, however, showed that there was no improvement in the position of the fragments and no effort at union of the bone.

Resection was accordingly determined on to remove the separated fragment, and the operation was done on the sixteenth day after the accident occurred. An incision was made on the inner side of the arm, in a line with the vessels, where the upper end of the lower fragment had become simply subcutaneous. It was found that this lower fragment had been forced through the muscles in front of the humerus by the violence of the original injury, and was firmly held in this position. This condition had prevented the approximation of the fragments. It was found to be impossible to extricate the bone from its unnatural position until a free incision had been made on the outer aspect of the arm. The sharp, jagged, detached piece of bone between the upper and lower ends of the shaft of the humerus was then removed. Its dimensions were one and a half inches by one-half inch, as already stated. The upper and lower ends of the fractured bone were freshened, one-quarter of an inch being taken from the upper and one-half inch from the lower fragment. Close approximation of the bones was effected by sutures with silver wire. (See Plate.) Firm union soon followed, and the boy was discharged from the hospital, with a useful arm, January 13, 1898, about nine weeks after the accident.

DR. G. G. DAVIS said that a couple of years ago he had a case almost identical with this one, only of the femur instead of the humerus. The femur was broken at the junction of the middle and lower third, the upper end of the lower fragment was



FIG. 1.—Comminuted fracture of the shaft of the humerus. (Morton.)



FIG. 2.—Comminuted fracture of the shaft of the humerus; loose fragment removed; main fragments secured in apposition by wire. (Morton.)

pushed downward and slightly outward, and the lower end of the upper fragment was displaced forward and appeared to be almost under the skin. There seemed to be a distance of almost two inches between the broken ends of the bone, but the skin was not broken. All attempts to reduce the deformity failed, so he incised and found a shell of bone about one and a half inches long, placed endways almost exactly, as is shown in the skiagraph, except that it seemed to be more firmly planted between the two ends of the bone so as to keep them apart. After the removal of this piece the reduction was readily effected and the ends were wired. In wiring bones he believed that it was best to use very thick wire; the wire used by him is at least one-sixteenth of an inch thick and extremely heavy. He was convinced that a considerable portion of the difficulties which arise in the treatment of ununited fractures comes from the fact that the wire which is used is not sufficiently firm to support the bone, while extremely thick silver wire does support it.

DR. JOHN ASHHURST said that he always used thick wire, bending the ends down or even turning them around the bone and hammering them firmly into position, thus gaining more secure fixation than can be got by simply twisting the wire. If the operation is properly done there is very little risk of the wire coming away or causing irritation. In the jaw it might do so, owing to the difficulty of preventing wounds in the mouth from becoming infected, but in the long bones it gives no trouble, and may be left in with safety. In ununited fractures of large bones he employed the silver splint and screws, as used by Halsted, which are better than the wire, as giving firmer fixation, but where the bone is small the heavy silver wire is very satisfactory. It is an advantage to hammer the wire down and even to give it a half turn around the bone, somewhat like a ferrule. He had never seen any irritation caused in this way, and he had patients walking about the city now with silver wires in their legs, or silver splints, without any inconvenience.

DR. W. JOSEPH HEARN said he always used heavy wire, as it gives fixation and acts as a splint. He also always left it in and hammered it down. He had a case recently where he was compelled to wire both the radius and ulna. The radial side healed, but the ulnar side became infected. Wherever infection occurs, the bone is soft. He never had any difficulty in getting

it out, simply taking a pair of forceps and firmly grasping the wire without untwisting, pulled it out. In his last case he found that sufficient callus was present to hold the bone in position. In patellas, where he had wired only twice, he had never had any trouble.

DR. DEFORREST WILLARD said he had a skiagraph which resembled very closely the one presented by Dr. Morton, except that it is of the femur. He wired this case three weeks ago, as there was no attempt at union seven weeks after the fracture. The skiagraph showed that the upper fragment was separated from the lower, while a fragment of the bone had been carried outward and had united upon the side of the shaft. He bevelled the two edges and wired them with the heaviest silver wire he could procure. Heavy wire acts very admirably in supporting and splinting the bones, while light wire allows them to move. As to the removal of the heavy wire, he nearly always turned it down and hammered it into the bone, permitting it to remain if it gave no trouble. If it does harm, it is just as easy to cut down upon it in the depths of the wound as if it were just under the skin, and by obtaining primary union one is less likely to have infection.

PERICÆCAL ABSCESS WITHOUT APPENDICITIS.

DR. W. JOSEPH HEARN reported the following case: A girl, seventeen years of age. Previous health good. No history of previous attack of indigestion. Six hours after a late supper of indigestible food she was taken with severe abdominal cramps and vomiting. The pains were over the entire abdomen. Her family physician gave anodynes to relieve her. Within twenty-four hours the pain was all gone, except some tenderness on the right side over the region of the cæcum. In the next twenty-four hours the pain and tenderness increased, with temperature 102° F. and pulse 106. Within the next twenty-four hours she was admitted to the Jefferson Hospital. The temperature was 101° , pulse 120. No abdominal distention, but the facial expression was characteristic of intense abdominal suffering. A point over McBurney's line was exquisitely sensitive. The most gentle pressure produced the most excruciating pain. The diagnosis of appendicitis was corroborated, and she was operated upon the same evening at nine o'clock. When the peritoneum was reached

it was found to be opaque and thickened,—œdematous. This was carefully opened, fearing adhesions to the bowels. This was followed by an immediate escape of one and a half ounces of pus. The cavity was dried thoroughly and the peritoneum opened outside of the pus-cavity and the parts packed around with iodoform gauze. On separating the parietal peritoneum from the visceral it was found that the pus-cavity was between the cæcum and parietal peritoneum. The cæcum was highly inflamed, and at the focus of abscess almost gangrenous. The appendix was next sought for. It was apparently missing, but by tracing down the longitudinal band of the colon (there were no adhesions of the end of the cæcum) it was found, or could be felt, in the sub-cæcal fossa (of Lockwood and Rolleston), between the layers of mesocolon, as the cæcum itself, while completely covered with peritoneum, has no mesentery. The outer layer of the mesocolon was divided in a vertical direction, and the outer layer was chosen both for convenience and to better preserve the blood-supply to the colon, and the appendix secured and removed. The layer of mesocolon was then closed with catgut sutures. The abdominal cavity was protected with iodoform gauze and the ends of the gauze left out of the wound. Retaining sutures were put in to close the wound upon the gauze not removed, which was done in seventy-two hours. Only a small piece of gauze was replaced over the abscess-cavity. The appendix, while in not a healthy condition, was not what we might term an appendicitis. The changes that had taken place in the mucosa were evidently secondary to the perityphlitis. The patient made a good recovery. The appendix was examined by Dr. Thomas Leidy Rhoads, who reports that sections were taken from the distal end and the middle of the appendix, hardened in Huydenhain's solution, infiltrated with paraffin, and stained with hæmatoxylin and eosin.

On examination the mucosa is found enormously swollen, the glands eroded, but a few remnants of the glandular structure remaining. The submucosa is likewise greatly inflamed, but the cell-infiltration does not seem to extend to the muscular coat. The peritoneal coat is not involved in the inflammatory process.

DR. JOHN ASHHURST, JR., said that he was satisfied that there are cases of typhlitis apart from appendicitis. In one case in which he operated, while the appendix was inflamed it was

apparently less diseased than that in Dr. Hearn's case, and was certainly less inflamed than the cæcum generally.

DR. HEARN rejoined that he could not explain an abscess in the location named. Dr. J. Chalmers Da Costa, who assisted him, agreed with him that it was a case of pericæcal abscess. Had it been an old case with many adhesions he could never have found the appendix, and, as it was, he had only found it by following up between the folds of the mesocolon. After going to so much trouble to find it he decided that he would remove it. He believed there are secondary affections of the appendix from disease of the cæcum. There were no adhesions at the end of the cæcum. We can, no doubt, have cases of perityphlitis, but they must be very rare. The appendix was three inches from the abscess cavity and between the two layers of the mesocolon. There was no connection between the two.

OSTEOTOMOCCLASIS.

DR. WILLIAM BARTON HOPKINS read a paper, entitled "A Preliminary Note on a Modified Operation to Correct Curved Tibiæ,—Osteotomocclasis," for which see July number, 1898.

DR. JOHN ASHHURST, JR., said: This operation is certainly a very ingenious one, but there is a possible objection to it, and that is that the incision made in the bone, as described by Dr. Hopkins, makes a gap when fracture is effected in the line of extension rather than in that of flexion. In the ordinary operation, as practised by Dr. Macewen, a wedge-shaped osteotome is used and the incision is made in the line of flexion, so that a gap is left in that position. There is always a probability of the bone gradually returning more or less to its original position, and a mistake, which he had seen made by many operators, is in not obtaining sufficient correction. They are satisfied with making the leg straight, and when the child recovers, in the course of two or three months, it will be found that the bowing has returned. The object of the cuneiform incision is that when the limb is straightened, the two cut surfaces coming together, the gap being on the outer side, or that of flexion, there will be less danger of the deformity recurring. If the incision is made as Dr. Hopkins has suggested, there certainly will be additional risk of reproduction of the deformity. This objection is more than theoretical; but, even apart from that, he did not see why this

method should be preferred to simple osteotomy, which is a very satisfactory operation.

DR. DEFORREST WILLARD said it seemed to him that there were objections to this procedure. In the first place it prolongs the time of cure, and he could not see that the advantages to be gained were sufficiently compensatory; in osteotomy the operation is completed at the one time. Osteotomy is theoretically a compound fracture, but practically it is only a simple fracture from the moment of the closure of the wound. For seven or eight years he had not seen one single case fail after osteotomy, nor had he seen one drop of pus during that time. Cases heal immediately and absolutely in which the entire correction has been done at one sitting. Formerly he did cuneiform osteotomies on badly bowed legs, and a few times had suppuration, but for several years he had performed only simple osteotomies. Instead of taking out a piece he had allowed a V-shaped space to remain in the posterior portion of the bone, which has been filled in with callus, using the precaution to employ an apparatus, when possible, for a year after completion of the osteotomy cure. He had never had any serious results. In only one case had he been obliged to do a second operation; an apparatus could not be afforded, and the child was allowed to go home too early.

It would seem to him that the advantage of deferring the osteoclasia for two or three weeks after the osteotomy is not compensatory, as it is easy to straighten the bone by the hand or the osteoclast immediately after the osteotomy, and produce the same result at once which Dr. Hopkins does at a later period. Usually he did not make a complete fracture, but a green-stick break, or he allowed the fragments to interdigitate, being careful not to permit any displacement. After fixing the bone in a gypsum splint in an over-corrected position, he always got a speedy and quick cure. The operation of aseptic osteotomy had been with him so absolutely complete and perfect as well as safe that he had learned to positively prognose a complete cure, without fever, without pain, without discomfort, and without suppuration. After aseptically locking these cases up in plaster-of-Paris he did not look at them for six or eight weeks, when the cure is complete. Having so good an operation already established, he thought the burden of proof with regard to a new operation lies with the originator to show the advantage over the old one. The

vital question is, Does this prolongation of procedures delay the cure, and does it in the end accomplish any more desirable result?

DR. H. R. WHARTON said he had seen quite a number of osteotomies done by other men and had done a good many himself, but had seen very few bad results. He had seen but four cases that did badly after an osteotomy. One was in a young person where a double osteotomy was done for a knock-knee, in which a profuse suppuration occurred and a subsequent operation was necessary to remove sequestra. He eventually recovered with good motion of the knees. In a second case profuse suppuration of the wound followed by necrosis of the tibia occurred after osteotomy. In another case secondary hæmorrhage followed an operation for curved tibias requiring ligation of the anterior tibial artery some weeks after the operation. A fourth case of osteotomy for knock-knee in which non-union resulted at the end of three months, a good result was obtained by opening the wound and freshening the edges of the wound with an osteotome.

DR. G. G. DAVIS thought the osteoclast which Dr. Hopkins had shown to be one of the neatest and best that he was acquainted with, and that it was an aid in completing the division of the bone and straightening it. The trouble he had had in the manual breaking of bones, even in the course of osteotomy, caused him to desire some more efficacious means. As regards the division of the operation in two stages that he was in doubt about it. Many of these cases are to be in the hospital as short a time as possible, and the addition of ten days might be an objection.

DR. R. H. HARTE said that osteotomies were among the simplest class of cases that surgeons had to deal with, and there are no cases so sure to be followed by satisfactory results. There is one point that he thought to be a good one, and that is the performing of two osteotomies on the same patient at the same time. If the osteotomy is on one limb at a time, he always followed the suggestion made by Professor Ashhurst as to over-correction. He used a straight splint and padded the upper and lower end and the centre, by which means over-correction was secured. He placed plaster-of-Paris on the outside and closed with a light gauze dressing. Children never have any trouble afterwards. No elevation in temperature is the rule, and the cases invariably do well.

DR. J. EWING MEARS, in connection with this subject, reported a case which came under his observation twenty years ago at St. Mary's Hospital. A child was brought in suffering from a fracture of the tibia at the junction of the upper and middle thirds, produced by an ice-wagon passing over the limb. An effort was made to get as correct an adjustment as possible. The fracture was treated with lateral splints, and the result was good. The union of the bone occurred promptly, and it was observed, after removing the splints, that the child, who had been bow-legged with curvature of the bone before the accident, had practically a straight leg on the injured side, while the other was still deformed. An interesting point is that the parent of the child instituted an action against the ice company whose wagon did the injury, and he was summoned as a witness. The lawyer for the plaintiff brought the child to his office to have him examined after a lapse of one and a half years. On stripping the child he showed him very conclusively that the injury had been of great benefit to the child, and told him that if he went into court the chances were he would be non-suited, or fail to get damages, because of the actual benefit that had been derived by reason of the accident. The suit was withdrawn and the case was dismissed. Of course, this was some years ago, before osteotomy was practised as it is at the present day.

EDITORIAL ARTICLE.

PATHOLOGY AND OPERATIVE RELIEF OF NON-MALIGNANT PYLORIC STENOSIS.¹

THE authors, Professor A. Carle and Dr. G. Fantino, review the cases of gastric disease which have been operated upon in their clinic in Turin. The number of cases was 102; of these, ten were merely exploratory in cases of non-operable cancer, five were carcinomata of the cardia, four were gastrotomies in cases of fibrous stenosis of the œsophagus where catheters were passed from below up, and eighty-three were operations for affections of the pylorus; forty-four of these were due to conditions other than malignant disease. The present editorial abstract will be confined to the views and results of the authors in dealing with these benign stenoses.

The most important aim of the surgeon in treating chronic dilatation of the stomach is to provide an early means of outflow from the stomach into the gut, and thus prevent abnormal fermentation. Pyloric incontinence is of no pathological importance, since experience has shown that removal of the pyloric sphincter has led to the cure of severe dyspepsia.

Entrance of food to the stomach produces contraction of the pyloric sphincter, which is only relaxed when the food has undergone stomachic digestion. Normally this occurs in six to seven hours, and the stomach becomes empty. Every pathological condition which hinders this transformation of the food results in pyloric spasm and a delay in the evacuation of the

¹ By Dr. A. Carle and Dr. G. Fantino, of Turin, in *Archiv für klinische Chirurgie*, xlvii, 1 and 2.

stomach. The first and most noxious result of this condition is fermentation, which is never absent when food remains too long in the stomach. Up to a few years ago it was believed that free hydrochloric acid in the stomach prevented fermentation. Experiments with watery solutions of hydrochloric acid seemed to support this, but the researches of Naunyn, Minkowsky, Kuhn, Ferranini, and Strauss demonstrate that the hydrochloric acid in the gastric juice has a very different effect on fermentation from that exerted by a watery solution of hydrochloric acid of the same strength. According to Strauss, hyperacidity, so far from preventing fermentation, is one of its most frequent causes. It hinders the digestion of the starches, and so leads to pyloric contraction and retention of food in the stomach. Fermentation is present whenever digestion is delayed by hyper- or hypoacidity resulting from any disease.

Fermentation exists in the normal stomach, since it always contains numerous bacteria. Fermentation begins during the first hour of digestion, but is of no importance if the food soon passes into the gut, where, according to Pasteur and Duclaux, the bacteria exercise a favorable influence on digestion.

Almost complete absence of hydrochloric acid from the gastric juice is compatible with perfect health if the stomach empties itself normally. The results obtained by Novaro, Doyen, and Carle show that suppression of the pyloric sphincter cures most severe forms of dyspepsia.

Hyperacidity causes no pain so long as the muscles of the stomach are strong enough to overcome pyloric contraction and digestion is not delayed. In other cases alkalies administered neutralize the hyperacidity and allay irritation, so that the pylorus relaxes and permits the chyme to pass. Lavage of the stomach acts in the same beneficial fashion on the pylorus. On the above premises the following conclusion is drawn:

“The cause of all disturbances in dyspeptics, those suffering

from hypoacidity as well as those from hyperacidity, is obstruction."

Pyloric contraction is not the only cause of obstruction. Apart from malignant tumors, obstruction by stones, and the pressure of tumors in the neighborhood, three causes may be mentioned:

- (1) Pure, fibrous stenosis of the pylorus from any cause.
- (2) Spasm of the pylorus caused by alteration of the mucous membrane or of the secretions.
- (3) Atony of the muscularis.

These affections were met in forty-four of the cases, and the following operations were performed: Pyloroplastic, fourteen times; digital dilatation of the pylorus, three times; gastro-enterostomy, twenty-seven times. In thirty cases the stenosis was fibrous, in nine simply spasmodic. In three cases the obstruction was due to gastric atony and in two to stenosis of the duodenum.

Burns from acids were the cause of fibrous stricture in four cases. The fact that when the stomach is empty or contracted (and after the entrance of strongly irritating fluids there is always contraction) the pylorus is the lowest point of the stomach and the lesser curvature is vertical explains why most lesions from the action of caustics are situated at the pylorus. Simple ulcers when near the pylorus very frequently end in stenosis. These are chronic and frequently very confusing, so that a positive diagnosis can rarely be made. These ulcers do not always exhibit characteristic symptoms. Gastralgia, pyrosis, acid eructations, and vomiting are common both to this condition and to hyperacidity. The only symptom which might lead to a diagnosis of probability (perforation is not considered here) is hæmorrhage, and this even is not constant, only occurring in one-fourth or one-third of the cases cited by various authors. In the cases here cited distinct hæmatemesis was only present in three, while scars from ulcers were the cause of stenosis in nine patients.

Apropos of the difficulty of making a diagnosis, one case of pyloric ulceration may be mentioned which ran its course without hæmorrhage, presenting such symptoms and appearances that even during the operation it was mistaken for cancer, and a microscopical examination was necessary to reveal the mistake in diagnosis. All the coats of the pylorus were destroyed and the process had spread to the liver.

Of the twelve cases (three with hæmatemesis, nine without) seven presented adhesions of the pylorus to neighboring organs with resulting displacements, hindering the passage of food. The same phenomena (adhesions and displacements) were found in twelve other cases in which it was impossible to establish the existence of previous ulceration because the mucous membrane could not be examined. In four of these the pylorus was not markedly narrowed, stricture being due to the altered position of the ring, owing to adhesions. In four cases the adhesions were with the gall-bladder, in one with gall-bladder, omentum, and pancreas.

It will thus be seen that peripyloritis is common,—it is present in 43 per cent. of the cases of benign stenosis (in 63 per cent. of the cases of pure fibrous stenosis). It is noteworthy that peripyloritis was absent in the four cases of stricture from the action of caustics.

In twenty-six out of the twenty-eight cases already referred to there was a mechanical obstruction to the emptying of the stomach, caused either by scarring of ulcers or by external adhesions.

There is another class of cases in which there is no fibrous stenosis or obstruction by adhesions, and in which the patients are brought into a very low condition through obstinate vomiting, severe gastralgia, pyrosis, obstruction, gastric dilatation, etc., the same symptoms as are found in true pyloric stenosis. In such cases there is no gastric atony, rather hypertrophy of the muscularis. Spasm of the pylorus is the cause of this condition. In

one case described palpation revealed a hard, deeply placed tumor in the pyloric region. On operation it was found that the pylorus was spasmodically contracted, giving the signs of tumor. Pyloroplasty gave a perfect cure. Spasm of the pylorus was only accompanied by distinct anatomical alterations in two cases. In the other seven cases of pyloric spasm the cause seemed to be an excess of hydrochloric acid in the gastric juice. It would be natural to suppose the hyperacidity the fundamental trouble of which the spasm and obstruction were mere results, but in many dyspeptics obstruction can give rise to hyperacidity. A vicious circle is thus formed where it would be difficult to decide which disease is primary and which secondary if the results of treatment did not elucidate matters. In all the cases operated upon the hyperacidity disappeared as soon as the obstruction was removed, and the evacuation of the stomach was facilitated.

The cause of the cramp must be sought in alterations of the mucous membrane, in a solution of continuity, in an acute or chronic gastritis, etc. This hypothesis is supported by what is known of similar affections of other sphincters. It is hardly necessary to state that when pyloric cramp has persisted for a long time a true fibrous stenosis may follow. The immediate cause of the fibrous stenosis is a chronic pyloritis. In nineteen out of forty-four cases of non-malignant stenosis there was peripyloritis present, although there were no symptoms of a local peritonitis.

Primary gastric atony was present in three cases. This condition is denied by many authorities. In the three cases operated on the pylorus was unusually patent. Assuming the presence of pyloric spasm, pyloroplasty was performed with practically negative results. In one of the cases a subsequent gastro-enterostomy was followed by a cure. Of the two cases of duodenal stenosis in only one was the lesion limited to the duodenum, in the other the pylorus was involved.

TABLE OF CASES AND CAUSATION.

Stenosis from acids (3 fibrous, 1 spasmodic)	4
“ “ ulceration (3 with hæmatemesis, 9 without) . . .	12
“ “ external adhesions	13
“ “ spasm	9
“ “ chronic pyloritis	3
“ “ primary atony	3
“ of the duodenum	2

Operation was, of course, only resorted to in the most severe cases of gastric trouble, cases which had resisted all medicinal means of treatment, and which were greatly reduced from the obstruction, pains, sleeplessness, distention, abnormal fermentation, and auto-intoxication. In two cases severe hæmatemesis was the indication for surgical interference.

In making such operations the surgeon has the following objects to attain:

(1) All obstruction must be removed.

(2) Entrance of bile into the stomach must be prevented. The difficulty of effecting this object has led Roux and others to give up lateral gastro-enterostomy and to perform very complicated operations. The authors, from their own experience and from that of others, criticise and condemn anterior gastro-enterostomy. According to them posterior gastro-enterostomy is the preferable operation. The operation is simplified by the dilatation of the stomach, which is present in all cases of benign and in two-thirds of the cases of malignant stenosis. In most cases it is not difficult to turn the great omentum, the stomach, and the colon upward and to bring the prepyloric portion of the stomach outside the abdomen. The opening in the mesocolon, necessary to expose the posterior stomach wall, is made by tearing with the fingers and causes no bleeding. Closure of the margins of this opening requires but few, if any, sutures. The use of the Murphy button renders the rest of the operation exceedingly easy and safe.

The posterior operation was performed in twenty-nine cases,

of which nineteen were non-malignant stenoses and ten were cancerous. Among the non-malignant cases there was but one death, and it was in the days when the Murphy button was unknown. The cancerous cases gave three deaths only, one of which could be ascribed to the operation *per se*. In all the other cases—twenty-four—the immediate and final results were excellent. In no case was there any disturbance of the stomach, nor of the loop of intestine above the anastomosis. In sixteen of the non-malignant cases recovery was so complete that the patients feel as if they had never been dyspeptics.

The latest and most complete statistics of Haberkant puts the death-rate for this operation at 42.8 per cent. The cause of this high rate is due to the difficulty of the operation and to the escape of gastric or intestinal contents, causing peritonitis. These dangers can be almost always avoided by restricting the operation to cases where the stomach is much dilated (it is generally found so) and by the use of Murphy's button. The death-rate in the authors' cases (when the button was used) has been reduced to 4 per cent. Von Hacker used this method in twenty-two cases, with three deaths, of which two were from marasmus and independent of the operation. Posterior gastro-enterostomy (named von Hacker's operation) does permit regurgitation of bile into the stomach, but this has never been sufficiently great to produce trouble, and in most cases the gradual formation of a new gastric sphincter puts a stop to it.

Dr. Fantino has examined Professor Carle's cases as regards the following points:

- (1) Changes in the peristalsis of the stomach.
- (2) The ability or non-ability of the new sphincters to close the outlet.
- (3) The capacity of the stomach.
- (4) The secretion of hydrochloric acid.

The history of the cases, as already given, shows that operation immediately improved the peristaltic power of the stomach,

though it did not render it normal. The stomach could generally empty itself, but did so gradually. Systematic examinations of the stomach contents were made after test-meals, etc., and showed that after an irregular period the stomach regained completely its power of emptying itself; in fact, as a rule, after gastro-enterostomy the stomach would be found practically empty in three to five hours after a meal.

Generally it was found that the stomach decreased in size soon after gastro-enterostomy, so that the formerly distended organ became normal in size. Examination of the stomach by means of distention with carbonic acid and by other methods showed that a sphincter was developed at the new opening and that its power increased with time. The secretion of hydrochloric acid after operation was studied. In cases where there was formerly hyperacidity, this condition was lost, and though the degree of acidity in an individual case varied from time to time, yet these variations did not depart from physiological limits. In the same examinations it was found that regurgitation of bile into the stomach took place, but was of no importance so long as the outlet from the organ was sufficient.

Cases of hypo- and anacidity showed no change in their gastric juice after operation, showing clearly that this condition is not dependent on obstruction but on previous changes in the mucous membranes,—these changes being probably in the nature of an atrophy of the peptogastric glands.

The authors compare the operation of gastro-enterostomy and pyloroplasty. Out of fourteen cases in which the latter operation was performed only one died (*i.e.*, 7 per cent.). Professor Carle's death-rate in gastro-enterostomy is 7.4 per cent.

The results of pyloroplasty, as regards function, have been little noticed in literature. To the authors' fourteen cases, three may be added where the operation was by tearing, but the results were the same. In all the seventeen cases the results were excellent, in thirteen of them perfect and permanent, as it is now

from three to seven years post-operation. In these the condition of the secretions and of the peristaltic power of the stomach was the same as after gastro-enterostomy for non-malignant stenosis. Diminution in size of the stomach was not so marked as would be expected in the presence of such remarkable recovery of the general health and of the stomach's power to empty itself. In all cases, with one exception, the gastric capacity was more or less diminished, but in no case did it become normal in size.

A few cases must be excepted where operation was performed for hyperacidity with gastric atony. In these four to five months after operation there was delayed evacuation of the stomach and a feeling of weight. Although the general improvement was considerable, yet the authors were persuaded that a posterior gastro-enterostomy would have given better results. In one of the cases a subsequent gastro-enterostomy gave a perfect recovery.

In cases where there was hyperacidity before operation there was a rapid return to the normal, but *not to below normal*, as was found after gastro-enterostomy. The authors believe that the rapid and great diminution in hydrochloric acid after the latter operation is due to the very rapid evacuation of the stomach after a meal, and do not deny the possible influence of a regurgitation of bile into the stomach. Both these conditions are absent after pyloroplasty, hence the difference in secretion.

In cases of hypo- and anacidity operation produced no change in this particular, and yet health was restored.

The results of pyloroplasty may be summarized,—

- (1) Regurgitation of bile into the stomach is prevented.
- (2) Secretion of hydrochloric acid, when it has been excessive, becomes normal.
- (3) If the secretion of hydrochloric acid has been diminished or absent before operation, it remains in *statu quo* after operation.
- (4) If there has been primary gastric atony, peristalsis is but little improved.

(5) This function improves rapidly or reaches perfection if the muscular contractility has been normal or increased, and when the obstruction was due to fibrous stenosis or pyloric spasm.

(6) In all such cases (as No. 5) evacuation of the stomach is accomplished in its physiological period. Only in rare cases, and these only in the first months, post-operation, may it be delayed.

(7) Capacity of stomach always decreases, but rarely becomes as small as normal.

(8) The pylorus recovers tone.

Points of difference between results of pyloroplasty and gastro-enterostomy are—

(1) The absence of regurgitation of bile, and hence the absence of any possible biliary influence on the gastric secretions.

(2) Evacuation of stomach is not accelerated, hence the difficulty the stomach has in reaching its normal size.

(3) The slight or negative result obtained by pyloroplasty in obstruction from primary gastric atony compared to the positive results from posterior gastro-enterostomy.

Pyloroplasty is too dangerous in cases where there is extensive, severe hardening of the tissues, much peripyloritis and adhesions to liver, gall-bladder, the colon, etc., and in cases of duodenal stenosis. Pyloroplasty is indicated in cases of spasmodic stenosis, and in slight annular stenoses from ulceration accompanied by muscular hypertrophy.

JOHN F. BINNIE.

REVIEWS OF BOOKS.

AMBROISE PARÉ AND HIS TIMES,—1510-1590. By STEPHEN PAGET. New York and London: G. P. Putnam & Son, 1897.

This is a well-written and beautifully illustrated volume, issued from the "Knickerbocker Press." It affords us many glimpses of life three hundred years ago, from the quaint diction of Ambroise Paré, and shows us how he had to live amid wars, carnage, pestilence, and plague. From the beginning to the end of his fourscore years he was in good health; thanks, partly to the fact that till he was a man he lived in country air and his parents were not too poor to give their children decent food and comfort, and partly to the healthy simplicity of his body and mind during his long life. With these he withstood all the hardships of war, the unwholesomeness of Paris, and the constant pressure of work. When some accident or chance attack of illness "laid him on his back," he treated himself, and let himself be treated, with great prudence and courage.

It is said that he went to the village school and afterwards to learn Latin with a chaplain, who, as he was ill-paid for his services, instead of teaching Paré, sent him to weed the garden and look after the mule. He was apprenticed to a barber-surgeon, and here is an extract of his life under him, which ought to be read by the students of the present day. (Page 14.)

"The cock has scarce done crowing when the apprentice must rise to sweep and throw open the shop, lest he lose the least payment that the tricks of the trade may bring him,—some early beard to be shaved. From this time on to two o'clock there are fifty customers; he must comb the wigs, hang about the parlour

or the staircase selling his stock. put folks' hair in curl-papers, cut it, or singe it. Towards evening, if the young man wishes to improve his mind, he will take a book; but the dulness and weariness of learning, which come of his not being used to it, soon bring him a sound sleep, with interruptions from the door-bell, warning him some rustic wants his hair cut. Never did any one ask so much of a servant, never in the Islands did a white man seek so greedily to get profit out of a black one, as a master barber-surgeon tries to make gain out of the bread and water he gives his apprentices. If it is not their afternoon out, he will not let them leave the shop, not even to go to lecture, for fear of losing the worth of some beard which perhaps will not come after all. That is why the professors, out of kindness, give their lectures to these unhappy young men at four o'clock in the morning."

In 1561, Paré received a compound fracture of the leg, from a kick of his horse. "They dressed me with such applications as we could get at the village; applying to the wound white of egg, flour, soot from the chimney, and fresh butter melted. I prayed Master Herbert (the surgeon) to treat me as one wholly unknown to him, and in reducing the fracture to forget the friendship he owed me."

The method of applying ligatures to vessels bleeding in an ordinary wound was as old as Galen, but Paré applied ligatures to vessels in amputation, the hæmorrhage of which was previously arrested by the application of red-hot irons to the part. Paré thus describes the treatment:

"So soon as the limb was removed they would use many cauteries, both actual and potential, to stop the flow of blood, a thing very horrible and cruel in the mere telling, . . . and truly, of six thus cruelly treated, scarce two ever escaped, and even these were long ill, and the wounds thus burned were slow to heal, and the burning caused such vehement pains that they fell into fever, convulsions, and other mortal accidents; in most of them, more-

over, when the scar fell off, there came fresh bleeding, which must again be staunched, and with cauteries which, thus repeated, consumed a great quantity of flesh and other nervous parts. By which loss the bones remained long afterwards bare and exposed, so that for many healing was impossible; and they had an ulcer there to the end of their lives, which prevented them from having an artificial limb."

One has many records of the time in which Ambroise Paré lived, of which the following are instances: One Mercier, who was suspected of being a Huguenot, was killed in Paris by two men who were well known. His widow applied to the magistrates for justice: "They made her no other answer but that her husband had been a dog of a minister, and if she said any more they would put her into the river in a sack."

The recent Zola trial in Paris causes one to consider whether Parisian justice has advanced much since.

"April: A madman whipped and sent to the Bastille for speaking his mind to the king. June 28: The two sisters whom the king had visited in prison, hanged, and burned on the Place de Greve. The mob cut down one of them and threw her alive into the fire. February 26: A man and woman hanged and burned for magic and witchcraft."

Paré waged a long war with the physicians from 1575 to 1585 over the publication of his collected works. "It was a sort of holy war for the deliverance of surgery from the bondage of medicine, and it is pleasant to read the fatuous indignation and futile reprisals of the physicians as they lost one battle after another."

Stephen Paget's final estimate of Ambroise Paré is thus summarized:

"His methods are antiquated, his theories all wrong, his books are the forgotten treasures of a few great libraries, but he has kept his hold for three centuries on men by force of character, and by that alone."

That may be, but the author in his estimate of Paré forgets the clear insight into sanitary science and the foreshadowing of preventive medicine set forth in Paré's account of the plague, especially on the duties of magistrates and public officers who keep order in towns. He there insists on isolation, the inspection of all foods, the purification of water-supply by thoroughly competent professional men. He also advised the people to be bathed with preservative water, which, from the aromatics it contained, is an approach to antiseptics.

Paré had considerable influence and respect among the Paris people, poor and rich, at the time of the great siege of Paris. "And we see him, eighty years old, afoot in the streets among the dying and the dead set suddenly face to face with the great leader of the League, bidding him, for God's sake and the poor, to preach peace to the people. It is not an incident in Paré's life, but the crown of it, the last of life for which the first was made."

Mr. Stephen Paget has performed his work well, and his volume is well worth reading.

D. B.

PROCEEDINGS OF THE SEVENTH ANNUAL MEETING OF THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES. Held at Columbus, Ohio, May 25, 26, and 27, 1897. Edited by JAMES E. PILCHER, M.D. 8vo, illustrated, pp. 700. Berlin Printing Co., Columbus, Ohio, 1897.

In these days when the space between "wars" and "rumors of wars" has suddenly vanished, and when grave possibilities in military surgery present themselves to the mind of every thoughtful practitioner in the country, it is gratifying to receive this report of the transactions of the Association of Military Surgeons, and to note what they have been doing during the "piping times of peace."

The present volume is larger than its predecessors, and like them is divided into sections, each embodying articles upon some

one line of surgery or medicine. The scope of the work is well indicated by the headings of these various chapters: Naval Medicine, Surgery, and Hygiene, Military Personal Identification, Clothing and Accoutrements, Military Physical Training, The Military Medical Officer, Sanitary Work in the National Guard, Transportation of the Disabled, Medical Service in the Field, The Service of Aid to the Disabled, Military Surgery, Instruction in Military Medicine and Surgery, Military Medicine, and, finally, Foreign Military Sanitary Matters.

Each chapter contains a number of papers, and a person interested in any one of the topics thus indicated will be sure to find helpful and valuable information in the volume. To discriminate among so many papers that are valuable is a difficult task, but attention may be directed to a few articles which are of equal value to the practitioner in either civil or in military life. The status of the radical cure for hernia, especially when the operation of Bassini or that of Halsted is employed, is well presented by Major John M. Bannister, U.S.A. As his records include operations chiefly upon male adults, who, from the nature of their calling, are more prone to a recurrence than are persons of more sedentary pursuits, the results obtained are exceptionally good.

The most valuable contribution to general surgery which the volume contains is the article upon "Fractures of the Lower Extremity of the Radius," by Dr. Lewis Stephen Pilcher, formerly Passed Assistant Surgeon, U.S.N. Dr. Pilcher's name has already been associated with the method of treatment of this injury, which he presented to the profession some years ago. In the present contribution he has embodied the results of riper years of experience, and has supplied numerous illustrations. The treatment advocated has the merit of being easily applied, is simple, and gives good results. Altogether the article may be truly said to be the best one upon the subject which has as yet appeared in medical literature.

One of the most suggestive articles in the book is by Lieutenant-Colonel A. A. Woodhull, U.S.A., who writes upon "Military Medical Problems." Surgeons of the National Guard, as a rule, have had no practical experience in the care of soldiers in battle, on the march, or even in camp. To them this article is especially valuable, for it presents in a graphic way the problems encountered by the medical officer during actual hostilities, and indicates the manner in which many may be solved.

It is interesting to note that one of the best articles upon "Instruction in First Aid" is written by Surgeon-Captain Rory Fletcher, of London. The regiment with which Dr. Fletcher is connected is the King's Royal Rifles, originally raised in this country, in 1755, as the Royal American Regiment of Foot.

Much of the credit for the preparation for the meeting, the arrangement of the programme, and the securing of papers is due to Captain James E. Pilcher, U.S.A., who is the secretary of the association, and in 1897 was stationed at Columbus. At the meeting he gave an exhibition drill of the hospital corps of the regiment then in the barracks, an account of which is briefly given; he prepared a paper upon "The Lines of Surgical Aid upon the Battlefield," and finally, in addition to this enthusiasm, executive ability, and literary skill, he has assumed the rôle of editor, and has produced a volume which is a credit to himself and to the organization which he represents.

HENRY P. DE FOREST.

AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY, under the general editorial charge of GEORGE M. GOULD. Philadelphia: W. B. Saunders, 1898.

The scope of this work has been detailed in reviews of previous volumes. In general it consists of brief summaries of selected articles from recent medical literature.

American and British journals have been reviewed with

care, and from the literature in other languages valuable extracts have been sifted. An effort has, very evidently, been made to emphasize the most important discoveries and changes, theoretical and practical, and in most instances we are pleased to agree with the editors in their judgment of what are the matters of greatest importance.

An acceptable article deals with typhoid fever, covering twenty-seven pages, of which the majority are devoted to discussions concerning the Widal test for diagnosis. Many details of the clinical microscopy of malarial diseases are given due space. There is also included a valuable recapitulation of the recent literature of blood-diseases. The surgeon-editors have interested us most in cysts and tumors, hernia, cerebral and neural surgery, and skiagraphy. Diphtheria is given prominence in the pathologist's review as well as in the chapter on pædiatrics. The pages on carcinoma are most valuable, and here one can find a fair consideration of the latest theory of the origin of this class of neoplasms. The paper entitled "Protection and Immunity" is very instructive. Novelties are not lacking in the volume. Among them may be mentioned a list of new remedies and instruments useful in practising ophthalmology, which closes the section devoted to this department. Two plates of rare beauty adorn the dermatological review. Among the newer drugs discussed with commendably conservative judgment are dulcin, tannoform, formaldehyde, pellotin, parthenin, lactophenin, and many others.

We suggest the above as points of special value. The general worth of the book is well known. It is not a treatise, but a compilation of a great variety of theories, opinions, experiments, and clinical observations. In its class it ranks well.

CHARLES H. GOODRICH.

INDEX.

- ABBE, ROBERT**, Nephrectomy for sarcoma of kidney, without recurrence after five years, 364; Neuro-fibromata of the cervical sympathetic, 487; Remarks on gastrostomy, 652; Remarks on operations without general anaesthesia, 667; Case of trephining and heteroplasty for traumatic epilepsy, 671; Remarks on appliances to replace a destroyed nose, 773.
- Abdomen**, Contusions of, discussion at the French Congress of Surgery, 384; Recovery after extensive wound of the, 745, 783.
- Abdominal incisions**, Some considerations on, 1.
- Acromio-clavicular dislocation**, Treatment of, 40.
- Ambulatory treatment of fractures of the leg**, 611.
- American Surgical Association**, Transactions of, Vol. xv., 1897, Review of, 398.
- American Year-Book of Medicine and Surgery**, 1898, Review of, 807.
- Anaesthesia**, Death during, from choking with vomit, 372; Operations without general, 581, 667.
- Anteflexion of uterus**, 348.
- Antitoxine in the treatment of tetanus**, 228.
- Anus**, Congenital absence of, 776.
- Aorta and pulmonary artery**, Pistol-shot wound of, 124.
- Appendicitis**, Chronic colitis as a symptom of, 733; chronic, in syphilitics, Treatment of, 74, 101; Diagnosis, pathology, and treatment of, 303; obliterans, Pathology of, 618; Points in the technique of operations for, 78, 101; with pregnancy and a dermoid cyst, 659.
- ASHHURST, JOHN, JR.**, Remarks on a case of hara-kiri, 787; on wiring fractured bones, 785; on typhilitis of non-appendical origin, 787; on osteotomy, 788.
- Aspirating-needle**, combined with a director, 69; Priority in, 400.
- Astragalus**, Excision of, for talipes, 529.
- BANDAGE** roller for gauze, 206.
- BANGS, L. BOLTON**, Remote results of operations for renal tuberculosis, 14, 84.
- BARTON, JAMES M.**, Operative treatment of appendicitis, 103.
- Bile-ducts**, Surgery of the, 697.
- Biliary passages**, Cases of surgery of, 529, 532, 535, 697.
- BINNIE, JOHN F.**, Why may recurrent carcinoma be locally worse than the primary disease in the same region? 238; Contribution to the study of appendicitis obliterans, 618.
- Bladder**, Extraperitoneal rupture of, complicated by fracture of the pelvis, 151; Resection of, for tuberculosis, 368; stone in the, Treatment of, when associated with hypertrophy of the prostate, 571.
- Bone-flaps**, with skin, to remedy large defects in the tibia, 250; Repair of, on a buried prothetic apparatus, 690.
- Brachial artery**, Gunshot wound of the, 666.
- Brain**, Abscess of the, after traumatic periencephalitis, 57; Cyst of, relieved by trephine, 770.

- Branchial carcinoma, 187.
- Breast, Amputation of, by Kocher's method, 213; Carcinoma of, with simultaneous sarcoma in the submaxillary region, 65; Carcinoma, operations for extirpation of, 781; Recurrence after removal of cancer of, amputation of upper extremity in cases of, 111; Study of twenty-nine cases of carcinoma of, submitted to operation, 285.
- BRIDDON, CHAS. K., Treatment of renal tuberculosis, 84; Result after operation for carcinoma of rectum, 90; Death during anæsthesia from choking with vomit, 372; Contribution to the surgery of the pelvis of the kidney, 416; Cases of amputation through the hip-joint, 524; Excision of astragalus for talipes, 529; Choledochotomy, 529; Cholecystotomy, 532.
- BROWN, F. TILDEN, Case of cholecystotomy and carcinoma of the pancreas, 535; Remarks on vasectomy, 769.
- Browning, The Normal and Pathological Circulation of the Central Nervous System, Review of, 693.
- BRYANT, JOSEPH D., Obscure shoulder injury, 665; Nitrous oxide as an anæsthetic, 669; Plastic attempts to replace destroyed noses, 774.
- BULLITT, JAMES B., Practical gauze bandage-roller, 206.
- CARCINOMA, Why may recurrent, be locally worse than the primary disease in the same region? 238.
- CARLE and FANTINO on Pathology and Operative Relief of Non-Malignant Pyloric Stenosis, Abstract editorial, 792.
- Carotid excision for malignant growths, 127.
- Castration for relief of obstructive hypertrophy of the prostate, Ultimate results of, 684; Value of, to facilitate detection of stone in the bladder in the presence of prostatic hypertrophy, 329, 383.
- Catgut, Sterilization of, by the Jefferson method, 49.
- Cerebral abscess following traumatic periencephalitis, 57; cyst, Trephining for, 770.
- Cervix uteri, lacerations of, Surgical treatment of, 333.
- Cholecystostomy, Improved technique for, 53.
- Cholecystotomy, 532, 535.
- Choledochocystotomy, Case of, 203.
- Choledochotomy, 529.
- Clamp, Use of, in united fractures, 553.
- CLUTTON, HENRY HUGH, Contribution to the surgery of the sacral region, 253.
- COLEY, WILLIAM B., Carcinoma of the breast, with sarcoma in the submaxillary region in the same individual, 65; Amputation of hip for sarcoma in a young child, 91; Influence of injury upon the development of sarcoma, 259; Cases of sarcoma of fibula and of tibia, 370.
- Colitis, Chronic, as a symptom of appendicitis, 733.
- Colon, Resection of, 661.
- CUMSTON, CHARLES G., Varicose veins and their treatment by Trendelenburg's operation, 626.
- Curettage for endometritis, 146.
- CURTIS, B. FARQUHAR, Treatment of renal tuberculosis, 84; Examination of rectum by endoscope, 91; Ligation of the first part of the subclavian artery, 540; Cyst of the tongue, 662; Trephining for cerebral cyst, 772.
- CUSHING, H. W., Wounds of the thoracic duct in the neck, 719.
- Cystoscopy in the male, 475.
- DA COSTA, JOHN C., Case of gunshot wound of the lung, 97.
- DAVIS, GWILYM G., Complete removal of the penis and testicles for malignant disease, 210; Use of iodoform, 679; Treatment of compound fractures, 784; On osteoclasia, 790.

- DAWBARN, R. H. M., Carotid excision for malignant growths, 127; Use of potato plates for intestinal anastomosis, 544; Vasectomy for hypertrophy of the prostate, 766.
- DEAVER, H. C., Operative treatment of appendicitis, 104.
- DEAVER, JOHN B., Case of swallowed foreign bodies located by the Röntgen rays, 64; Points in the technique of the operation for appendicitis, 78, 106; Operative treatment of carcinoma of the breast, 113; Remarks upon the differential diagnosis, the pathology, and the treatment of appendicitis, 303; Radical cure of inguinal hernia, 459.
- DIXON, CHARLES H., Case of choledochocystotomy, 203.
- DOWD, CHARLES N., Study of twenty-nine cases of carcinoma of the breast submitted to operation, 285.
- DULLES, CHARLES W., Remarks upon tetanus, 234.
- EDEBOHLS, GEORGE M., The other kidney in contemplated nephrectomy, 425.
- Electrolysis for uterine fibromyoma, 353.
- Endometritis, 143.
- Epilepsy, traumatic, Trephining for, 670, 770.
- Eyeball, Partial resection of, 640.
- FACE, Case of epithelioma of skin of, with unusual course of lymphatic transmission, 193.
- Fæcal fistula relieved by exclusion of segment of intestine, 537.
- FARIES, RANDOLPH, Lateral curvature of the spine in a cured case of Pott's disease, 209; Operation for uraniscoplasty, 374.
- Female generative organs, Diseases of, 129, 333, 491.
- Femur, fractures of, Treatment of, 594; Sarcoma of, in a young child, 91.
- FENGER, CHRISTIAN, Surgery of the bile-ducts, 697.
- Fibrolipoma, Retroperitoneal, 657.
- Fibromyomata of uterus, Treatment of, 350.
- Fibula, Excision of, for sarcoma, 741.
- Fractures, compound, Use of wire for fixation of, 785; How to hasten consolidation in cases of delayed union, 95; of the lower extremity, Treatment of, 593; Radiographs of, 653; Ununited, treated with bone-clamp, 553.
- FRANKLIN, MELVIN M., Traumatic periencephalitis with cerebral abscess, 57.
- FREEMAN, LEONARD, Forcible straightening of the spine in Pott's disease, 463.
- GALL-BLADDER, floating, Case of, with cholelithiasis, 199; Observations on surgery of the, 711; Improved technique in operations on, 53.
- Gastro-enterostomy for non-malignant pyloric stenosis, 796; Posterior, with Murphy's button, 769.
- Gastrostomy by Marwedel's method, 650.
- Generative organs, female, Diseases of, 129, 333, 491.
- GERSTER, ARPAD G., Hydronephrosis for ureteral calculus, 543; Case of subphrenic abscess and pyopneumothorax, 647; Subphrenic abscess and pyæmia, 647; Sarcoma of retained testicle, 649; Retroperitoneal fibrolipoma, 657; Appendicitis complicating pregnancy, 659; Fracture of neck of humerus with dislocation of head, 660; Remarks on operations without general anæsthesia, 667.
- Gigli's wire saw, 658.
- Gloves, Use of, in surgical operations, 224.
- Goitre, substernal, Case of, 764.
- HALL, ERNEST, Method for partial resection of the eyeball and of the optic nerve, 640.
- Hara-Kiri, A case of, terminating in recovery, 745, 783.

- HARTE, RICHARD H., Treatment of appendicitis, 101; Use of iodoform, 677; Radical cure of hernia, 682; A case of hara-kiri, which terminated in recovery, 745, 783; Remarks on osteotomy, 790.
- HARTLEY, FRANK, Observations on the etiology of tumors, 401.
- HEARN, W. J., Operative treatment of cancer of the breast, 114; Remarks on tetanus, 236; Operation for saddle-nose, 377; Use of iodoform, 679; Wiring fractured bones, 785; Pericæcal abscess without appendicitis, 786.
- Hepatoptosis, Surgical treatment of, 115.
- Hernia, Lumbar, following nephrorrhaphy, 539; Modified operation for the radical cure of, 459.
- Hip, Amputation of, for sarcoma of femur, 91; amputation, Cases of, 524, 753; Congenital dislocation of the, 249.
- HOMANS, JOHN, Combined aspirating needle and director, 69; Priority in devising a grooved aspirator needle, 400.
- HOPKINS, W. BARTON, Operative treatment of pneumo- and pyothorax, 216; Operation for the relief of scaphoid sternum, 219; Osteotomoclasia; A modified operation to correct curved tibiæ, 788.
- HORWITZ, ORVILLE, cases of secondary syphilis complicated with chronic appendicitis, Treatment of, 74, 101; Value of castration to facilitate detection of stone in the bladder, in the presence of prostatic hypertrophy, 329, 383.
- HOTCHKISS, L. W., Case of complete traumatic rupture of the urethra, 83; Treatment of renal tuberculosis, 88.
- Humerus, Compound fracture of the, 783; Fracture of neck of, with dislocation of head into axilla, 660.
- Hydrogen peroxide, Dangers attending use of, in certain cases, 382.
- Hydronephrosis, Case of, 367; from stone impacted in the ureter of a child, 643.
- Hysterectomy for myoma, 355.
- ILEO-CÆCAL coil, Resection of the, 729.
- Intestinal anastomosis with potato button, 543; fistula, Result of operation for, 363.
- Intestine, Exclusion of segment of, for relief of fæcal fistula, 537; Obstruction of, by Meckel's diverticulum, 448; resection of, for gangrene, 650.
- Iodoform, The abuse of, 676.
- JOHNSON, ALEXANDER B., Removal of nose for epithelioma, 772; Traumatic rupture of the kidney, 774.
- JONAS, AUGUST FREDERICK, Contribution to the surgery of the suprarenal capsule, 436.
- JONES, WILLIAM D., Improved technique for avoidance of fistula after cholecystostomy, 53.
- KAMMERER, FREDERICK, Resection of the bladder, 370; Exclusion of segment of intestine for relief of fæcal fistula, 537; Case of intermittent hydronephrosis, 542; dislocation of the thumb reduced by operation, 654; Exploratory nephrotomy, 655; Suprapubic lithotomy, double nephrotomy, nephrectomy, 663; Local anesthetics, 669; Case of substernal goitre, 764; Results of vasectomy for hypertrophy of prostate, 768; Traumatic rupture of the kidney, 775.
- KEEN, WM. W., Sterilization of catgut by the Jefferson method, 49; Treatment of carcinoma involving walls of great vessels, 94; Case of gunshot wound of the lung, 100; Cystosarcoma of the omentum, 220; On the use of gloves in surgical operations, 224; Dangers attending use of peroxide of hydrogen in certain cases, 382.
- KELLY, HOWARD A., Cystoscopy and catheterization of the ureters in the male, 475; The examination of the bladder and the catheterization of the ureters in men, 71.

- KEYES, EDWARD L., Treatment of stone in the bladder, when associated with hypertrophy of the prostate, 571.
- Kidney, Abscess of, subjected to nephrotomy, 366; tuberculosis of, Nephrectomy for, 368; Contribution to the surgery of the pelvis of the, 416, 542; The other, in contemplated nephrectomy, 425; Floating, with floating gall-bladder, 199; Sarcoma of, no recurrence after nephrectomy, 364; Traumatic rupture of the, 774.
- Kidneys, Surgical affections of the, 643, 655, 663; tuberculosis of, Remote results of operations for, 14, 84.
- L**ANNELONGUE'S sclerogenic method in tuberculosis, Results of, 251.
- Laryngectomy, Results after, for carcinoma, in Bergmann's clinic, 246.
- LE CONTE, R. G., Operative treatment of appendicitis, 105; Congenital absence of anus and rectum, 776.
- Leg, fractures of the, Treatment of, 606.
- LILIENTHAL, HOWARD, Operations without ether or chloroform narcosis, 581, 669; Resection of transverse colon for cancer; no return after three and a half years, 661.
- Lithotomy, Suprapubic, 663.
- Liver, floating, Surgical treatment of, 115.
- LLOYD, SAMUEL, Excision of fibula for sarcoma, 741.
- Lung, Case of gunshot wound of, 97.
- M**CBURNEY, CHARLES, Exploratory nephrotomy, 655.
- McCOSH, A. J., Treatment of renal tuberculosis, 87; Lumbar hernia following nephrorrhaphy, 539; Trephining and heteroplasty for traumatic epilepsy, 670.
- Mallory's Manual of Pathological Technique, Review of, 395.
- MARKOE, F. H., Remarks on vasectomy, 767.
- Mattress for operating-table, 682.
- MEARS, J. EWING, Drainage after operations for appendicitis, 105; Treatment of tetanus, 237; Treatment of temporomaxillary ankylosis, 672; Use of iodoform, 681; Correction of curved tibia by accidental fracture, 791.
- Meckel's diverticulum as a cause of intestinal operation, 448.
- Meigs on the Origin of Disease, Review of, 695.
- Metritis, 143.
- MEYER, WILLY, Technique of nephrectomy, 369; Treatment of renal tuberculosis, 86; Proctotomy for papilloma of the rectum, 88; Roberts's operation for prolapse of the rectum, 89; Case of resection of small intestine for gangrene, 650; Gastrostomy by Marwedel's method, 650; Gigli's wire saw, 658; Remarks on vasectomy, 767; Posterior gastro-enterostomy, 769; Trephining for intracerebral cyst, 770; Artificial nose, 773.
- Military Surgeons of the United States, Proceedings of the Association, Meeting of 1897, Review of, 805.
- MITCHELL, JAMES F., Extraperitoneal rupture of the bladder, complicated by fracture of the pelvis, 151.
- MONTGOMERY, DOUGLASS W., Case of epithelioma of the skin of the face, with unusual course of infection of lymph nodes, 193.
- Moore, Treatise on Orthopædic Surgery, Review of, 692.
- MORTON, THOMAS G., Use of iodoform, 677; Compound fracture of the humerus, 783.
- MORTON, THOMAS S. K., Case of tetanus treated by antitoxine, 232; Use of iodoform, 680; Congenital absence of anus, 781.
- Murphy's button, Use of, in gastro-enterostomy, 769.
- MURRAY, F. W., Tuberculosis of kidney and bladder, 369.
- Myomectomy, Abdominal, 351.

- NEPHRECTOMY**, The other kidney in complicated, 425.
- Nephrorrhaphy** followed by lumbar hernia, 539.
- Nephrotomy**, Cases of, 366, 368; and nephrectomy for pyonephrosis, 663; Exploratory, 655.
- Nervous System**, Central, Review of Browning on the Circulation of the, 693.
- New York Surgical Society**, Transactions of, 83, 88, 363, 524, 647, 654, 661, 764.
- NOBLE, W. H.**, Operations for breast carcinoma, 781; Cases of hip-joint amputation, 753.
- Nose**, Epithelioma of, 772; saddle-, Operation for, 377.
- O'CONOR, JOHN**, Surgical treatment of acute rheumatic arthritis, 177.
- OLIVER, JOHN CHADWICK**, Resection of the ileo-cæcal coil, 729.
- Omentum**, Cystosarcoma of the, 220.
- Operating-table** mattress, heated electrically, 682.
- Origin of Disease**, Review of Meigs on, 695.
- Orthopædic Association**, American, Review of the Transactions of, Vol. X., 1897, 552; Surgery, Review of Moore on, 692.
- Osteotomoclasia**, 788.
- Ovaries**, Remote results of the removal of both, 125.
- PANCREAS**, Carcinoma of, 371, 535.
- Paré, Ambroise**, Review of Paget's Life of, 802.
- PARKHILL, CLAYTON**, Use of the bone clamp in ununited fractures, fractures with malunion, and recent fractures with tendency to displacement, 553.
- Patella**, fractures of, Treatment of, 601.
- Pathological Technique**, Review of Mallory's Manual of, 395.
- Pelvis**, Fracture of, complicated by extraperitoneal rupture of the bladder, 151.
- Penis**, malignant disease of the, Treatment of, 210.
- PENROSE, CHARLES B.**, Tetanus after trachelorrhaphy, 231, 236.
- Pericæcal abscess**, without appendicitis, 786.
- Perineum**, Injuries of, 133.
- Peritoneum**, Review of Robinson on, 396.
- PERKINS, JOHN W.**, Case of hydronephrosis from stone impacted in the ureter of a child, 643.
- Pes valgus**, Correction of, 375.
- Philadelphia Academy of Surgery**, Transactions of, 101, 228, 672, 783.
- Philadelphia College of Physicians**, Transactions of the surgical section of, 93, 209, 374, 776.
- PILCHER, JAMES E.**, Proceedings of the Association of Military Surgeons of the United States, 1897, Review of, 810.
- PILCHER, LEWIS STEPHEN**, Diseases of the female generative organs, 129, 333, 491; Ultimate results of castration as a means of relief for obstructive hypertrophy of the prostate, 684.
- PORTER, WILLIAM G.**, Cases of tetanus treated by antitoxine, 228; The abuse of iodoform, 676.
- Pott's disease**, Forcible straightening of the spine in, 463.
- POWERS, CHARLES A.**, Branchial carcinoma, 187.
- Pregnancy** complicated by fibromyoma of uterus, Cases of, 362.
- Prolapsus of uterus**, Treatment of, 341.
- Prostatic hypertrophy**, with stone in the bladder; Value of castration in cases of, 329, 383; complicating stone in the bladder, Treatment of, 571; Ultimate results of castration for, 684; Vasectomy for, 766.
- Pulmonary artery and aorta**, Pistol-shot wound of, 124.
- Pylorus**, Pathology and operative relief of non-malignant stenosis of the, 792.
- Pyopneumothorax**, Operative treatment of, 216.

- RADIUS**, Fracture of the head and neck of, 365; Fracture of the head of, 536.
- Rectum**, Congenital absence of, 776; Pathology and treatment of strictures of the, 545; Proctotomy for papilloma of, 88; Prolapse of, treated by Roberts's operation, 89; Result of operation for removal of, 90; Endoscopic examinations of the, 91.
- Retroflexion of the uterus**, Anterior cuneo-hysterectomy for, 248; Treatment of, 535.
- Rheumatic arthritis**, Surgical treatment of acute, 177.
- RHOADS, THOS. L.**, Treatment of acromio-clavicular dislocation, 40.
- ROBERTS, JOHN B.**, Excision of subclavian vein, 93; Treatment of delayed union in fractures, 95; Amputation of upper extremity, in recurrence of malignant disease after excision of the breast, 111; Tetanus after abortion, 233, 236; Tarsectomy for talipes, 776.
- Robinson on the Peritoneum**, Review of, 396.
- Röntgen rays**, Use of, to locate swallowed foreign bodies, 64.
- Round ligaments**, Shortening of, for retroflexion, 337.
- SACRAL region**, Contribution to the surgery of the, 253.
- Sacro-coccygeal tumor**, Successful excision of, 255.
- Saddle-nose**, Operation for, 377.
- Sarcoma**, Influence of injury in the development of, 259; of fibula, 370, 741; of tibia, 371.
- Semilunar bone**, Traumatic dislocation of the, 365.
- Serum-therapy in staphylococcus infection**, 242.
- SHOEMAKER, GEORGE E.**, Use of iodoform, 678; Chronic colitis as a symptom of appendicitis, 733.
- Shoulder**, Recurrent dislocation of the, 364; Obscure injury of, 665.
- SIMPSON, FRANK FARROW**, A surgical washstand, 759.
- Smith on Spinal Caries**, Review of, 398.
- Spina bifida**, sacral, Successful excision of, 253.
- Spinal Caries**, Review of Noble Smith on, 398.
- Spine**, Forcible straightening of, in Pott's disease, 463; Lateral curvature of, in a case of cured Pott's disease, 209.
- Staphylococcus infection**, Immunization and serum-therapy in, 242.
- Sternum**, scaphoid, Operation for the relief of, 219.
- STIMSON, LEWIS A.**, Recurrent dislocation of the shoulder, 364; Traumatic dislocation of the semilunar bone, 365; Fracture of the head and neck of the radius, 365; Irreducible unilateral dislocation of temporo-maxillary joint, 366; Diagnosis of stone in kidney, 369; Fracture of the head of the radius, 536; Intestinal anastomosis with potato-button, 543; Radiographs of fractures, 653.
- Stomach**, Opening of, by Marwedel's method, 650; Pathology and operative treatment of non-malignant stenosis of the pyloric orifice of, 792.
- Stone in the bladder**, with prostatic hypertrophy; Value of castration to facilitate detection of, 329, 383.
- Subclavian artery**, Ligation of the first part of the, 540.
- Subclavian vein**, Excision of, 93.
- Subphrenic abscess and pyopneumothorax**, Case of, 647; and pyæmia, 647.
- Suprarenal capsule**, Contribution to the surgery of the, 436.
- Swallowed foreign bodies located by the Röntgen rays**, Cases of, 64.
- Sympathetic**, Neurofibromata of the cervical, 487.
- SYMS, PARKER**, Remarks on operations without general anæsthesia, 668.

TALIPES, Excision of astragalus for, 529; Tarsectomy for, 776.

Tarsectomy for talipes, 776.

Temporo-maxillary ankylosis, 572; Joint, Irreducible unilateral dislocation of, 366.

Testicle, retained, Sarcoma of, 649.

Tetanus, Cases of, treated by antitoxine, 228.

THOMPSON, JAMES E., Intestinal obstruction caused by Meckel's diverticulum, 448.

Thoracic duct, cervical, Wound of the, 719.

Thumb, dislocation of, Incision for reduction of, 654.

Thyroid, Accessory, of the base of the tongue, 244.

Tibia, Defects of, remedied by skin-bone flaps, 250.

Tongue, Cyst of, 662.

Trephining for intracerebral cyst, 770; for traumatic epilepsy, 670.

Tuberculosis of kidney and bladder, 368; renal, Remote results after operations for, 14, 84; surgical, Results of Lannelongue's sclerogenic method in, 251.

Tumors, Etiology of, 401.

Typhlitis of non-appendical origin, 786.

URANISCOPLASTY, 374.

Ureter of a child, blocked by stone, hydronephrosis resulting, 643;

Repair of Wounds of the, 46; Catheterization of, in the male, 71, 475.

Urethra, Traumatic rupture of, 83.

Uterus, Diseases of, 143.

VAGINA, Diseases of, 139.

VAN ARSDALE, WILLIAM W.,

Gunshot wound of the arm, severing the brachial artery, 666.

Varicose veins, Treatment of, 626.

Vasectomy for hypertrophy of the prostate, 766.

Ventrosuspension of uterus for retroflexion, 339.

Vulva, Diseases of, 131.

WARBASSE, JAMES P., Treatment of fractures of the lower extremity, 593.

Washstand, Surgical, 759.

WEIR, ROBERT F., Result of operation for intestinal fistula, 363; Cases of nephrotomy, 366; Case of hydronephrosis, 367; Tuberculosis of kidney and bladder, 368.

WENDEL, A. V., Case of floating gall-bladder and kidney, with cholelithiasis, 199.

WHARTON, H. R., Mercurial treatment of chronic appendicitis, 105; Use of iodoform, 678; Remarks on osteotomy, 790.

WILLARD, DE FOREST, Use of iodoform, 677; Mattress for operating-table electrically heated, 682; Wiring fractured bones, 786; On osteotomy, 789.

WILSON, H. AUGUSTUS, Treatment of pes valgus, 375.

WINSLOW, RANDOLPH, Note on the repair of wounds of the ureter, 46.

WOOD, GEORGE B., Amputation of the breast by Kocher's method, 213.

WOOLSEY, GEORGE, Some considerations on abdominal incisions, 1; Treatment of renal tuberculosis 85; Carcinoma of the pancreas, 371.

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